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American Fern Journal

A QUARTERLY DEVOTED TO FERNS

Published by the

AMERICAN FERN SOCIETY

EDITORS
C. V. MORTON
R. C. BENEDICT IRA L. WIGGINS
A. C. SMITH

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American Fern Journal

VOL. 44 JANUARY–MARCH, 1954 NO. 1

Matthew D. Mann, Jr., 1884-1953

R. C. BENEDICT

"Mr. Mann's death was a real loss to the fern world. He was so interested, and such a delightful, unassuming person." Matt Mann was probably known in that favorable light to more members of the Fern Society than any other person. The sentences quoted represent the kind of comment that has come from many members. He was devoted to the work of the Society and gave of his time far beyond the bare essentials of the office of Treasurer. During 1953, his health was poor. A heart attack early in the year kept him from attending any of the meetings, but with the service of Mrs. Mann and of his daughter, Mrs. Bauer, the work of the Society was carried until he made an unexpectedly good recovery and was again able to indulge in his beloved hobby of caring for outdoor ferns and for a large number of sporelings. On the basis of his improved condition, he again accepted nomination as Treasurer, but a new complicating illness developed in October. He still hoped that he might be able to carry on the work of Treasurer, but a recurrence of the heart trouble developed and he died December 20.

Mr. Mann began his interest in ferns about sixteen years ago. Starting out to build a rock-garden, field-trips led him to turn to ferns, and his extensive fern garden was developed. In 1940 he joined the Fern Society, and some eight years later he became Treasurer. His fern garden comprised nearly one hundred and fifty

[Volume 43, No. 4, of the JOURNAL, pp. 137–184, was issued January 14, 1954.]

different species and varieties. Some years ago he built a fluorescent-lighted plant-breeding case. Since then, he grew ferns winters as well as summers. Many of the plants in his garden were specimens he had raised from spores, including a fine set of New York hart's-tongue sporelings. Except for the few he wanted to keep, Mr. Mann raised young plants to give away. For a number of years, his fern garden was opened for an annual June visit by members of the Fern Society and the Torrey Botanical Club. Mrs. Mann expects to continue living at her home in Roselle and to maintain the main fern garden. Following a suggestion which Mr. Mann made in the Fern Journal, his fern library has been turned over to the Society as a gift.

Mr. Mann was born in 1884. He took his undergraduate work at Yale University and graduate work at Cornell University. He was the first operational head of the Bayway Refinery, Standard Oil Company of New Jersey, and in that position contributed important improvements in the refinery processes for some of which the Company holds 32 patents.

The Hart's-Tongue in Michigan

DALE J. HAGENAH

In mid-July of 1953, Dr. Marion T. Hall, of the Cranbrook Institute of Science, and the writer spent ten days in the Upper Peninsula of Michigan. Our time was divided between sand-dune areas, since Dr. Hall was making a study of *Hudsonia*, and rock-fern localities, especially those to be visited by the American Fern Society Foray a few weeks later.

On the evening of July 21 we made camp near the mouth of the Tahquamenon River. The next morning we were up and on our way early, for we hoped to make the ferry crossing of the Straits of Mackinac in time to

get home that night. Botanizing for the day was to be confined to one or two short stops along the route, including one near Ozark, Mackinac County, where *Asplenium viride* and *Woodsia Cathcartiana* had been found in 1952. In checking our maps we noted that there were some rock outcrop areas near Trout Lake, Chippewa County, only a few miles from the Ozark locality, and on remembering that there was a record for *Polystichum Lonchitis* from that vicinity, we decided to take time for a short reconnaissance of the area.

As we came into one of the areas which our geologic map showed as having rock at or near the surface, we noticed a few ledges in a wooded hillside. A little investigation showed that the hill was capped by a dolomite formation exposed in a series of ledges and low bluffs along the hillsides. Much of the surrounding territory had been cleared for farming but was now abandoned or used for pasture. The hillsides, too rocky and steep for farming, were wooded with second-growth maple, basswood and birch, while the Holly Fern (*Polystichum Lonchitis*) and the Fragile Fern (*Cystopteris fragilis*) grew on shaded ledges along the edge of the road. Leaving the car, we followed the ledges through the woods until we came to a place where part of the hilltop had been cleared and the dolomite was exposed to the sun on a little bluff about ten feet high. Crevices there seemed likely places for rock ferns so I investigated the exposed area thoroughly. The only additional find was a few wilted plants of *Botrychium Lunaria* var. *minganense*, a few yards from the base of the bluff. In the meantime Dr. Hall had continued the exploration of the wooded part of the hillside. As I was about to rejoin him, I heard him giving a bird-whistle which he used as a signal. When I asked what he had found, he replied that he had a fern for me to see. I soon reached him and he directed my attention to the base of a small

ledge. There, growing with the Holly Fern, was a small colony of the American Hart's-Tongue (*Phyllitis scolopendrium* var. *americana*)! A few yards up the slope was another colony.

Although we combed the hillside over, we could find no more Hart's-Tongues. A careful check showed that there were eight plants, with a total of twenty-eight fronds, including some from the previous year which were still partly green. Nearly half of the fronds were fertile. After photographing the find we investigated three other rock outcrop areas nearby, and although the Holly Fern was abundant in places, we found no more Hart's-Tongues. A few weeks later, another and more extensive search of the areas was made by Mrs. Hagenah and myself, but again no additional Hart's-Tongue plants were found, so for the present, at least, the right of Michigan to be included in the range of this species must rest on this one small station.

The situation of the station is not unlike those in Ontario, since it is a deciduous woods on a slope with exposures of dolomite belonging to the Niagara formation, and with the Holly Fern as a close companion. The approximate location is 46° 11′ N. and 84° 57′ W. We collected five fronds (*Hall and Hagenah 896*); one has been deposited at Cranbrook Institute of Science; the others will be distributed to the University of Michigan Herbarium, Michigan State College, the Gray Herbarium and the National Herbarium.

Dr. Hall's find extends the range of this species some

190 miles north and west from the nearest known station, near Stokes Bay in the Bruce Peninsula, Ontario. It is the most westerly station, and may be the most northerly, being about the same latitude as the New Brunswick station where the Hart's-Tongue is now believed to be extinct. Although new stations have been found from time to time in New York and Ontario, extending the range of the Hart's-Tongue as originally known there, the Michigan station is the first new station in a new state or province since the New Brunswick find was reported in 1881.

The Michigan station, like those in Ontario, is near the edge of the Niagara formation of Silurian rocks; however, unlike the exposures of this series in Ontario and Wisconsin, where the rocks of the Bruce Peninsula and the Door peninsula, respectively, have long been known for their interesting ferns, very little is known about the ferns of the Niagara formation in Michigan. Although these rocks extend through a long arc from Drummond Island to the Garden Peninsula and St. Martin Island, a distance of more than 150 miles, the outcrops are intermittent and seldom prominent. Throughout most of the area underlain by the Silurian rocks, there is a mantle or covering of glacial drift. Although the outcrops have been studied geologically and have been quarried extensively in some localities, they have not attracted much attention from botanists until recently.

The discovery of the Hart's-Tongue is the climax in a series of recent finds which show that the Niagara outcrops may be among the most promising localities for fern hunting in Michigan. *Asplenium viride*, apparently first found in Michigan by Norman Fassett on outcrops near Pickford, has been rediscovered in that area, and in addition, it has been found near Ozark, Mackinac County, near Manistique, Schoolcraft County, and on

The Hart's-Tongue and Holly Fern near Trout Lake, Michigan
Photograph by Dr. Marion T. Hall

Drummond Island. In the last four years other finds have been forthcoming in Michigan such as the first known stations in the eastern part of the Upper Peninsula for *Camptosorus rhizophyllus*, *Woodsia Cathcartiana*, and *W. obtusa*, several new localities for *Polypodium virginianum*, *Polystichum Lonchitis*, and *Asplenium Trichomanes*, several new stations for *Botrychium Lunaria* and *B. Lunaria* var. *minganense*, in some of which the plants were luxuriant and abundant. One collection of *Cystopteris fragilis* from Drummond Island has proved to have the verrucose spores typical of the long-neglected *C. Dickieana*. Probably the most interesting find, next to the Hart's-Tongue, was *Asplenium platyneuron*, two plants of which were found in 1952 by the writer and R. F. Hauke while botanizing a rock outcrop area near Detour, Chippewa County, with Dr. Warren H. Wagner, Jr. So far as I know, this is the most northern station for Ebony Spleenwort. Among its associates were *Botrychium Lunaria* var. *minganense* and *Habenaria unalascensis;* the latter is one of the famous Bruce Peninsula disjuncts. All of these finds have been made in the last four years by a handful of collectors and as the result of a relatively small amount of field work, and certainly a number of the larger, but less accessible, outcrop areas, to my knowledge have not been investigated.

I wish to express my thanks to Dr. J. H. Soper, of the University of Toronto, for information furnished on the location of Ontario stations; to Dr. W. H. Wagner, Jr., of the University of Michigan, for suggestions in regard to the manuscript; and to Dr. Robert T. Hatt, Director of Cranbrook Institute of Science, for permitting the use of the plates which illustrate this paper.

CRANBROOK INSTITUTE OF SCIENCE, BLOOMFIELD HILLS, MICHIGAN.

Thoughts on Hardy Fern Culture After Many Years' Experience[1]

A. J. MACSELF

In writing for publication in "The British Fern Gazette" I am very well aware that the remarks will be read by some who have had experience as wide as, or wider than, my own, and whilst it might be argued that since I am writing for the benefit of new, and thus far, inexperienced members, it is wiser to be upon the safe side than it would be to run risk of failure through error, I do not do so, but rather do I urge that anyone who, having adopted methods which are at variance with my recommendations, and have found them successful, will write to the Editor, contradicting any statement of mine and giving in detail their ideas of procedure which may be adopted by other growers with reasonable prospects of success.

First, let it be assumed that some reader contemplates making his first hardy fernery; among his first questions will be, "Where is the best position I can choose?" In reply to that, I say the real essentials are shade and shelter from the roughest, battering winds that blow. In some gardens, shady corners or strips already exist and where they do not, they can usually be created by means of hedges or tall-growing plants, and it generally can be contrived to ensure that whatever is used to create necessary shade, can also become the means of sheltering from buffeting winds.

Next to choice of situation comes preparation of soil,

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[1] Reprinted from The British Fern Gazette, Vol. 8, pp. 12–18. 1951, by permission. This paper detailing the best principles of fern culture in England will be of interest to our readers. We are sorry to report that Mr. Macself died shortly after the above article was written. Readers interested in joining the British Pteridological Society should communicate with our member of long standing, Rev. E. A. Elliot, South Stoke Vicarage, near Reading, England. (Ed.)

and this should be very thorough, because among other advantages of hardy ferns, is the fact that, when once they are planted they need not be moved for many years. That is an economy of labour which, in these days of costly gardening, cannot be ignored.

By insisting that preparation must be thorough, it is not inferred that the soil must be enriched by addition of much manure of either animal or chemical nature. The fact is, I am no believer in either of these for ferns which it is hoped will last for many years. I am well aware that large, fine fronds may be produced by liberal feeding, and this is necessary in the case of ferns grown in pots for the purpose of exhibition, and that is dealt with later, but for the plants grown for permanency, in the garden, my idea is that a "fed" fern makes poor growth and is prone to come uneven in growth afterwards.

The "thoroughness" referred to above concerns the correction of physical defects in the soil. Many soils are either too heavy, owing to being charged with clay to an excessive degree, or are too light and sandy for ferns. In either case the remedy lies in leaves, decomposed vegetation from a compost heap, and anything which will create a spongy, moisture-soaking and humus-making root-run for the ferns. In excessive cases it may be necessary to dig such soil more than once, adding the vegetation at each digging. That is why I refrain from stating that any period of time should elapse between digging and planting, preferring to say that planting may be commenced when ground is ready.

Do not be eager to remove stones from the soil. In my own case, when I made my present fernery some quarter-century ago, I actually dug in quantities of added stones. That is for two reasons. One is that stones help drainage, by holding apart particles of soil which would, otherwise, bind too closely. At the same

time I have found that immediately underneath every stone is a patch of soil which will remain moist long after surrounding soil dries during periods of drought.

I am a firm believer in the great advantage of deep digging, mainly in the interests of drainage. It cannot be too strongly stressed that, although ferns like moisture, it is extremely few which can tolerate anything approaching stagnation of water in their root-run. For this reason, I say that nothing short of two full spade's depth is sufficient for the first digging of the outdoor fernery.

Do not be misled by the oft-made statement that to grow ferns one must have brown fibrous peat. As a matter of fact, many ferns are absolutely indifferent as to the presence or absence of fibrous peat in their root-run. Some ferns actually dislike it, and the proportion which must have it is extremely small. I have not bought a bushel of brown peat in the twenty-five years I have lived in my present place, but, I add, I have used much granulated sphagnum peat for digging in. This I use instead of leaf mould, chiefly because it rots down at a slower pace than leaf mould, and I invariably make sure that it is thoroughly moistened by repeatedly turning and watering before it is dug in. This is because sphagnum peat which is dry, will remain dry for a long time, even though surrounding soil may be excessively wet.

Eventually, the ground becomes ready to start planting. If this happens to be at the beginning of September, one may then plant the evergreen ferns, such as the Polystichums, Scolopendriums, and the like. September seems to be the best month of the year to remove these, but I prefer Spring planting for Athyriums, Lastreas, Cystopteris and other deciduous ferns, because I dislike moving them when they approach their normal period of dormancy and rest. It will be noted that I am using the generic names which I have known since

boyhood. I do this despite the knowledge that botanists have decreed that Polystichums are Aspidiums, Scolopendriums are Phyllitis, some Lastreas are Nephrodiums, while other are Aspidiums, etc. The majority of fern growers, however, seem to be more familiar with the older names. The first botanical name I can recollect having memorised was Goniophlebium subauriculatum, and I still call that plant by that name despite the knowledge that it is now called a Polypodium.

As to choice of ferns to form the nucleus of a collection, my view is that if any particular fern is one's special favourite it should be the first fern planted, because it is one of the chief delights of having a garden that it enables its owner to grow the plants which are most admired and loved. My own choice would be to place the Polystichums first, Scolopendriums second and the variations of Polypodium vulgare third. Of the last named I have thirty varieties, including three or four forms of P. cambricum, and I have added at various times Athyriums, particularly of setigerum varieties, and the queen of all A. Clarissima, Lastreas, Cystopteris, Aspleniums and a number of kinds which have proved hardy, although not British. These include Adiantum venustum Don, Cyrtomium falcatum, and two American varieties of Polypodium vulgare.

I would add, here, that should any particular class of fern refuse to thrive in the garden available, it is better to abandon it and its class in favour of another which, obviously, is more suited to the soil and locality. My reason is that there is more real satisfaction in contemplating really flourishing plants than can be obtained by trying to make special patches of soil for plants which cannot grow happily in one's garden. As an example of what I mean, I recall, many years ago, having found a flourishing colony of Polystichum lonchitis on the Minera range of mountains in north-west Wales. I care-

fully lifted some healthy young plants and brought them home, but none of them thrived in my lowland garden. Eventually, they all died out. The result is I never plant this fern now, preferring to plant varieties of P. angulare or P. aculeatum, which make large, pleasing plants.

I had similar failure with Asplenium fontanum, and A. septentrionale, brought from the late George Oliver's garden at Hawick, Scotland, and these I do not try to grow now. Of course, it is necessary for a beginner to ascertain that it is either soil or situation that is the cause of failure, and not some mistake in planting, which can be rectified by exercising greater care, and my advice is that one should lift clean and replant anything which is apparently failing, before it gets too far gone for recovery. Let this be done during the period of new, young growth. That, I find, is the best time for such removal.

STRIPPING THE CAUDEX

This operation is singled out because I have found it to be the most important part of preparation for replanting all those ferns which grow from crowns, as distinct from rhizomes. The caudex is that stem which lengthens, gradually, with the new embryo fronds in a cluster or crown at the top. Prominent examples are Polystichums, Lastreas, Athyriums, Scolopendriums, etc. Old, dead fronds, which are cut off at ground level, leave bases below ground. These bases increase in number and become hard and woody. In course of time they hamper attachment of young roots, which issue from the caudex, with the soil from which they should obtain nourishment, and whenever a fern is lifted for transplanting it is very important to strip or detach these bases of old fronds from the caudex. This can be done easily, although it is a task requiring some pa-

tience. Frond bases are attached to the caudex in spiral form. The correct method of procedure is first to clear away all adhering soil, then place a finger on the top of the lowest frond base, and gently press it downward. Having detached and removed that one do likewise to the next, and so proceed until the caudex is freed from all old frond bases. Sometimes a caudex will appear to be excessively stripped, but if care has been taken to break no young roots, and the cleaned plant is put into a hole large enough to take the roots without cramping, with the cluster of embryo fronds at, but not below, ground level, it will, generally speaking, make good growth. Fine soil should be carefully and closely packed, but not hardened, all round the plant, and if the fern experiences a period of drought during the first season it should be watered thoroughly, but as infrequently as is reasonable. In transplanting Polypodiums of the vulgare class, rhizomes should not be wholly buried in the soil, and all rhizomatous ferns should have their rhizomes kept very near to the soil surface. I like to transplant rhizomatous ferns just as their new fronds begin to show in curled heads. This will vary according to season. For instance, sometimes I have transplanted Polypodiums during April (although they are really deciduous, their fronds remain green throughout winter). Sometimes May has half done its course before Polypodiums can be moved, but if unable to complete transplanting by the end of May, I prefer to leave the plants undisturbed for another year. I do not like to inflict upon them the double task of making new root and grappling with summer drought. This, I admit, is due, chiefly, to my dislike of doing much watering. Although I like, now that I have bidden goodbye to days of youth, to boast of the years which many of ferns have stood, undisturbed, in the same position, I am bound to admit that many would be the better for

transplanting at lesser intervals of time.

GROWING FERNS FOR EXHIBITION

A good many years have passed since the authorities of Southport Flower Show first introduced a number of classes for British ferns. It cannot be said that results of that innovation have reflected great credit upon "The British Pteridological Society." In the beginning, the new feature promised well, and there were no less than seven entries in the largest class for hardy ferns occupying a hundred square feet of space. We felt justified in writing for the next issue of "The British Fern Gazette" (No. 11, Vol. 5, published in December, 1928) that "the benefits, accruing to our hobby from this first venture of Southport Show are undoubtedly great," but later experience has damped our view, for entries in this, the biggest class, have diminished annually, until, on more than one occasion it has transpired that one entry only has confronted the judges, and in the smaller classes for six, three, and even for single plants, in pots or other suitable containers, have shown a tendency to decrease rather than increase in number of exhibits.

It is because the suggestion has been made to me that many growers of choice hardy ferns have never attempted to grow anything for show purposes that I have decided to add this section to my article, and it is hoped that, shortly, results may show themselves in materially increased numbers of entries in the smaller classes for stipulated numbers of hardy British ferns. As with other sections, I have expressed my own views, but shall welcome the ideas of others, even contradictory.

First, choose only youngsters of known quality and removed from normal species. Grow the plants in pots beginning with young plants and, if necessary, using pots of small size for the first season's growth. Use particular care in preparing soil for potting ferns; pay-

ing great attention to combination of fibrous loam, and vegetable earth, together with enough sharp sand to enable water to pass through, but not more than enough to ensure this. Remember there is no plant-food in sand, neither does it possess power to soak up and hold moisture and dissolved plant-food. My advice is limit the addition of manure to a dusting of bone meal. This decomposes slowly, providing phosphorus, without which fern fronds lack substance and power to resist sudden changes.

A point where I differ from many growers is where it is advised to withhold any feeding until plants have reached a certain age or stage of development. I have said already that when ferns are grown for home enjoyment and for long life, I do not believe in "feeding," but when growing for exhibition it is essential that they shall be fed, even though it is probable that the same plant will be unfit for exhibition for a second season. It is just as firmly my belief that a fern which is to be fed, requires food in its young stages of growth, but it should be weak and should be applied every time the soil in the pot becomes dry enough to demand water—not at intervals, in greater strength, and intervened with plain watering. My objection to the latter custom is that plant-food which is taken up by spongy matter in the soil, quickly combines with those plain-water applications, and may pass with surplus water, through the drainage hole without helping to feed the plant at all.

It cannot be earlier than the second season, and more probably, it will be the third or fourth, before a fern is really fit for the show bench. Meanwhile it will have been potted on, perhaps twice or thrice, until it reaches the size of pot required. (Here, let me say, it is necessary, sometimes, to be guided in this matter by the schedule of the particular show concerned.) It is a pity to put a plant into a 7-inch pot and to find later that a

show schedule says that no pot many exceed six inches. Finally, let me say that as members of the British Pteridological Society it is a duty, whenever possible, to enter exhibits of hardy ferns at any show where classes are provided. It is to help those who have had only short experience in this branch of horticulture that this article has been written. Criticism of any point will be welcomed.

Dryopteris austriaca var. intermedia

C. V. MORTON AND CHARLES NEIDORF

With this number we begin a series of illustrations of ferns of the eastern United States. The photographs, which are enlargements of fruiting fronds, have been made by the junior author over a period of several years. The process by which these pictures have been made has been detailed in two papers.[1] The specimens from which the photographs were made were collected on the grounds of the Boyce Thompson Institute, near Yonkers, New York.

The exact status of the Intermediate Shield-fern is still a matter of debate. A definitive decision will probably have to await the determination of its genetic constitution and that of the related *spinulosa*. The scientific name is also still discussed. The usual name has been *D. spinulosa* var. *intermedia* (or sometimes *D. intermedia*). The priority of the epithet *austriaca* was pointed out by the senior author.[2] Dr. Wherry[3] has disagreed, saying, "... the chances that it [*austriaca*] could really correspond to any American taxon seem slight," thus indicating doubt that a species described from Austria could occur in the United States, an atti-

[1] Studio Fern Photography, by Charles Neidorf. This Journal **37**: 67–77. 1947; and Close-up Photography of Ferns, by Charles Neidorf, This Journal **43**: 49–66. 1953.
[2] This Journal **40**: 220. 1950.
[3] This Journal **42**: 67. 1952.

Dryopteris austriaca var. intermedia

tude a little inconsistent with his acceptance of *D. spinulosa* as an American native, although the type of this came from Germany.

The illustration shows a portion of the middle of a fertile pinna. Five pairs[4] of pinnules are seen, each of these with five or six pairs of segments. The lowest superior segment (i.e. on the side toward the apex) comes out first, thus giving the type of venation known technically as anadromous. These basal segments are a little different from the others, broader and mostly 3-toothed at the apex; they bear also a pair (or sometimes two pairs) of minute lateral teeth. The other segments are rather uniform, being abruptly narrowed at the apex into a sharp, spinulose tip, and bearing a single small tooth on the distal margin.

As shown in the picture, the sori are borne on the basal, anterior branch of the veins in the segments. They are dorsal on the veins (although this is not obvious in the illustration), i.e. the vein does not end with the sorus but continues beyond it, not, however, reaching the margin.

The indusia are clearly shown; they are nearly circular in outline, of the shape usually called reniform, i.e. attached at a point laterally in a small basal sinus. They open on the side facing the apex of the pinnule and are eventually forced back into a reflexed position by the developing sporangia. The back of the indusium is densely covered by minute, stalked glands, which appear in the photograph as minute white dots. These glands are characteristic of *intermedia*, although somewhat similar glands are found also in typical *austriaca*, but more sparingly. These glands are not confined to the indusia but may be seen also on the vascular parts of the blade, particularly along the under side of the main rhachis of the pinna.

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[4] According to the usual terminology, although, as is clearly seen in the picture, the pinnules are not really paired at all but are strictly alternate.

American Fern Society

Report of the President for 1953

The sixtieth year of the American Fern Society has been marked by so many activities deserving of notice in the Fern Journal that this report will be kept in the briefest possible compass. A membership growth from 490 to 520, nine meetings, with a total attendance of close to 300, the participation of at least 30 members as leaders and hosts of these meetings, a total of 188 pages in the Fern Journal—all these are evidence of a year of very healthy activity.

The activities and growth have brought with them a train of problems. The edition of the Journal must be increased by 100 to take care of the growth of over 90 members during the past two years. With so many field-trips to be reported, three of them from three to seven days in length, space in the Fern Journal has become a problem. While such reports have interest and are often of some scientific value, a fair proportion of the Journal pages must be reserved for articles of interest and value to the world-wide membership of the Society. The simplest solution seems to be gifts for extra pages and more sustaining memberships. The alternative seems to be the cutting down of the reports, or their issuance as supplementary bulletins. A number of generous gifts have been received and I have no hesitation in indicating that all extra contributions for the Journal will be gratefully accepted by the Treasurer.

The Society suffered a severe loss during the year in the death of its Treasurer, Mr. Matthew D. Mann, Jr. His interest, his friendly correspondence, and his unremitting efforts as Treasurer and in more general ways have been a major basis for the increased interest and

growth of the Society during these past few years of his tenancy of the office.

To Mr. Walter S. Allen, who volunteered to take over the Treasurer's work until a more permanent nomination for this position can be made, the Society owes a great deal. Mr. Allen had filled the position of Treasurer in the years before Mr. Mann's election, and had contributed the same kind of devoted service. He knew very well what was involved when he volunteered to take over the work for what is the most demanding period of the year.

Attention is called to the program for 1954 which has been announced in a preliminary mimeographed bulletin. Besides the field trips noted in that bulletin, several others are listed on another page.

The special interest of members is asked for the proposed new National Fern Garden to be established in suitable parts of the National Arboretum in Washington. To be fully successful, this proposed fern garden, under the auspices of the Fern Society, will require several steps in its development. First, it will need a good *working* committee to do manual work as well as other sorts to put the chosen sites into appropriate condition for the reception of plants. Second, there will be needed not only contributions of plants, but of some funds to finance shipments of rock, plants, and other items. In order of need, a local working committee and a working fund come first and second. When these are assured, living ferns will be welcome.

To start the project, Dr. James W. Johnston, Jr., 3900 Reservoir Road, Washington, D. C. has been named as Committee Chairman. Miss Lillian Willier, 320 Sheridan St., N.W., Washington, D. C. has accepted secretaryship of the Committee. They will be glad to send bulletins of information to any enquirers. As a sponsoring and advisory committee, Dr. Edgar T. Wherry,

Dr. Paul Bartsch, and Mr. James E. Benedict have been named.

Respectfully submitted,
R. C. BENEDICT, *President*

Report of the Secretary for 1953

The annual meeting of the Society was held with the American Institute of Biological Sciences on the campus of the University of Wisconsin. The Fern Society's Session of Contributed Papers was held on Monday morning, September 7th, the first regular day of the meetings. Nine papers were presented, ranging in content from physiological to phytogeographical, and providing a most interesting session which was very well attended. Mr. Richard L. Hauke, formerly of the University of Michigan and currently at the University of California, spoke on his analysis of a suspected *Equisetum* hybrid population, treating the problem of *E. litorale* and its confusion with other species of this genus. "The *Lycopodium Selago-lucidulum* Problem" was then discussed by Prof. David F. Grether, of Michigan State Normal College. Dr. Rolla F. Tryon followed with a report of his research on "Apogamy in *Selaginella rupestris*," correlating certain peculiarities which he discovered in the spores with the geographical distribution of these peculiarities; Dr. Tryon presented a most interesting hypothesis of the origin of apogamy in this species, based upon these spore data. Dr. W. H. Wagner then spoke on investigations of suspected North American hybrid ferns, notably *Polystichum acrostichoides* × *Lonchitis*, *Botrychium oneidense*, *Cystoperis bulbifera* × *fragilis*, *Cheilanthes californica* × *Pellaea densa*, and *Adiantum Jordanii* × *pedatum*, and some of the botanical problems involved in this type of research. Dr. William Bloom, of Valparaiso University, gave a physiological paper on the effect of temperature on sexual reproduction and the early growth of young

sporophytes of the Marsileaceae. The ferns of Pacific Island atolls in relation to theories of the recent invasion of atolls by plants was discussed by Dr. F. Raymond Fosberg. Dr. A. J. Sharp's paper on "Collecting Ferns in Mexico," which followed, while admittedly not treating the ferns in detail, gave some general problems of affinities of floras of the eastern United States, Mexico, and eastern Asia, which suggest some interesting possibilities for pteridological affinities. Unfortunately, Dr. Clair A. Brown was unable to speak on his work on the spores of Louisiana ferns at this time, but we hope to hear of this research at some future meeting of the Society. Mr. Donald F. M. Brown of the University of Michigan followed Dr. Sharp's paper with a report on the problems of taxonomy in *Woodsia*, and of his expedition to study and collect the living plants in the field. Our program was so full that by the time noon arrived, Dr. Herbert M. Clarke, who conducted our meeting, was unable to present his own paper on a method he has developed for raising fern prothallia; he handed out a mimeographed sheet to persons interested in their culture, and later set up a demonstration of the method. Dr. Eula Whitehouse, of Southern Methodist University, was able to present, unfortunately, only an abbreviated part of her talk, illustrated by moving pictures, on the fern habitats in Kenya and Tanganyika, Africa, because there was so little time left in the Session.

The Fern Society's Luncheon was held in the Wisconsin Memorial Union, after the Session of Contributed Papers; there were 30 persons in attendance. During the following days there was an Exhibition by the Fern Society held in Room 207, Birge Hall (Biology), including demonstration of the technique of raising ferns by Dr. Clarke, a large collection of dried specimens showing forms of *Lycopodium Selago* by Mr. Grether,

a series of charts of life-cycles and ranges of *Selaginella rupestris* by Dr. Tryon, and a set of voucher specimens of Appalachian Aspleniums with drawings of chromosomes mounted on herbarium sheets by the writer. A joint meeting of the Fern Society with the American Society of Plant Taxonomists and the Systematic Section of the Botanical Society of America was held Monday afternoon to present a Symposium on Linnaeus, commemorating the Bicentennial of the publication of *Species Plantarum*. A local field trip, starting from the University of Wisconsin campus, and covering Parfrey's Glen, Devil's Lake, Fern Dell near Lake Delton, and Rocky Arbor State Roadside Park, was arranged by Dr. Clarke and led by him and Mr. Grether on Tuesday morning, September 8.

Several other research papers on pteridophytes were presented at other sessions, notably those by Miss Margery Marsden and Prof. Ralph H. Wetmore of Harvard University on "*In vitro* cultures of apices of *Psilotum nudum*," Dr. I. M. Sussex and Dr. Taylor A. Steeves, also of Harvard, on "Growth and development *in vitro* of excised fern leaves," and Dr. William J. Crotty of Washington Square College, New York University, on "Problems of primordial development and heterophylly in the fern *Acrostichum aureum*."

I wish to thank especially Professor Herbert M. Clarke of the Department of Botany of the University of Wisconsin for his cooperation in taking charge so efficiently of our activities there. This was, in my opinion, the best meeting the Society has had since the A.I.B.S. began its activities.

The increase of Society membership during the last year of 30 members, bringing the total membership to 520, is gratifying. We deeply regret the loss by death of three of our members—Mr. W. Herbert Dole of West

Orange, N. J., a former Vice President of the Society, who joined in 1926; Mrs. Ann K. Roony, of Warick, Orange Co., N. Y., who became a member in 1916 and died in her 87th year; and finally, our Treasurer, Mr. M. D. Mann, Jr. of Roselle, N. J., who first became a member in 1940.

The next meeting of the A.I.B.S. will take place at the University of Florida, Gainesville, Florida. It is hoped this will provide an opportunity for many members of the Society to participate again, and also to see first-hand some of the interesting native pteridophyte flora of that holiday state. While I regret having to resign my officership in the Society at this time because of pressure of other duties, I hope to return to service again in the future when pressure subsides. I congratulate the Society on its choice of the new Secretary, Prof. Mildred E. Faust, of Syracuse University.

Respectfully submitted,

WARREN H. WAGNER, JR., *Secretary*

Report of the Treasurer for 1953

The Fern Society suffered a grievous loss in the death of its Treasurer, Mr. M. D. Mann, Jr., on Dec. 20, 1953. It was characteristic of him that his records were kept up to date and accounts in balance at all times. Along with his beautifully kept fern garden he was intensely interested in promoting the growth of the Fern Society, and counted it a labor of love to serve its best interests. The writer took over temporarily at the end of December and has prepared this annual report from Mr. Mann's well-kept records. We are pleased to announce that Dr. Ronald L. McGregor, Department of Botany, University of Kansas, Lawrence, Kansas, has accepted the appointment of Treasurer to fill out the unexpired term.

The income, from dues of members and subscribers, sale of back numbers, etc., added to the cash on hand January 1, 1953, amounted to $3,182.16—the highest since 1950 when the Weatherby Memorial number was issued. Sustaining members contributed $290.00, a much appreciated addition to our income. Two have become life members, making the present total 25. Sale of back numbers of the Journal brought in $128.28; we still have a considerable inventory of these Journals, which are a mine of useful information, both enjoyable and informative. Gifts during the year amounting to $35.50 are much appreciated income. Publication costs have increased to $1,630.00 for the four issues—over 80% of our total expenses.

No withdrawals have been made from the reserve fund or the two special accounts. The Society is in a healthy condition financially, thanks to the interest and response of its members.

Receipts	*Amount*	*Total*
Cash on hand, January 1, 1953		$1,397.74
1952 membership arrears	$ 26.00	
1953 membership renewals	604.45	
1953 sustaining members	290.00	
1953 new members	128.10	
1954 membership renewals	17.70	
1954 new members	24.00	
1952 subscription arrears	6.30	
1953 subscription renewals	113.87	
1954 subscription renewals	183.95	
Life memberships	70.00	
Sale of back numbers	128.28	
Sale of reprints	127.32	
Sale of surplus library books	5.00	
Sale of Cumul. Index, etc.	.80	
1953 advertising	20.00	
Miscellaneous	3.15	
Gifts	35.50	
		1,784.42
		$3,182.16

Disbursements	*Amount*	*Total*
A. F. J. Vol. 42, No. 4	$524.82	
A. F. J. Vol. 43, No. 1	381.61	
A. F. J. Vol. 43, No. 2	388.29	
A. F. J. Vol. 43, No. 3	335.84	
Envelopes and mailing	41.00	
Reprints	94.02	
Expenses		
President	29.59	
Secretary	32.80	
Treasurer	15.00	
Editor	14.95	
Curator of Herbarium	—	
Life memberships (to special acc't No. 2)	70.00	
Miscellaneous	6.80	
		1,934.72
Cash on hand, January 1, 1954		$1,247.44

STATEMENT DECEMBER 31, 1953

Assets	*Amount*
Cash on hand	$1,247.44
Bissell Herbarium Bequest	584.85
Life Membership Fund	671.47
Reserve Fund	1,600.76
Inventory A. F. J.	3,403.72
A. F. S. Library	300.00
	$7,808.24

Liabilities	*Amount*
Capital Account	$5,826.27
Suspense credit	
1954 memberships	41.70
1954 subscriptions	183.95
Distribution Vol. 43, No. 4	500.00
Bissell Herbarium Fund	584.85
Life Membership Fund	671.47
	$7,808.24

Respectfully submitted,
WALTER S. ALLEN, *Acting Treasurer*

Report of the Auditing Committee

We hereby certify that we have seen the books and accounts of Mr. M. D. Mann, Jr., Treasurer of the American Fern Society, and have obtained confirmation of the correctness of the Society's balances on hand, as set forth in detail in the accompanying report of the Acting Treasurer, Mr. Walter S. Allen.

Charles Neidorf
Charlotte Learned
Cyrus Darling
Auditing Committee

Report of the Judge of Elections

The results of the balloting for officers of the American Fern Society are as follows:

For President
Ralph C. Benedict 161
For Vice-President
Dwight M. Moore 162
For Secretary
Mildred E. Faust 160
William E. Liggett 1
For Treasurer
M. D. Mann, Jr. 159
For Honorary Membership
Professor Alma G. Stokey 165

I therefore declare the following candidates elected to the several offices: President, Ralph C. Benedict; Vice-President, Dwight M. Moore; Secretary, Mildred E. Faust; Treasurer, M. D. Mann, Jr. However, since the duly elected Treasurer, Mr. Mann, passed away while the balloting was in process that office will be subject to being filled by appointment as provided in the constitution of the Society. Elected to Honorary Membership, Professor Alma G. Stokey.

Respectfully submitted,
DALE J. HAGENAH, *Judge of Elections*

Report of the Editors for 1953

The growth of the Fern Journal, now in its 44th volume, during the past ten years is illustrated by the following table showing the number of pages in the various volumes:

Volume	34	132	pages
"	35	140	"
"	36	128	"
"	37	128	"
"	38[1]	220	"
"	39	128	"
"	40[2]	264	"
"	41	128	"
"	42	164	"
"	43	184	"

The larger size of the last two volumes is the result of the generous response of our members to our new class of "sustaining members," which has allowed a number of extra pages. The Journal is limited in what it can print by its income and by the articles submitted. We hope that it may continue to present both popular and technical articles. In this connection, a quotation from a letter to our late Treasurer, Mr. Mann, may be appropriate:

"Ever since I received your most cordial note with the acknowledgment of my membership last year, it has been my intention to let you know how much I appreciated it. Somehow, it seemed to make me feel that I have been accepted into a group that sets for itself the mission of being helpful to the less-informed without the usual atmosphere that surrounds scientific organizations. I was delighted to learn that there was a society devoted to the study of one of the fascinating and basic forms of plant life, and now, after a year of exposure to the

[1] Financed in part by personal gifts for the memorial number for Dr. Maxon.

[2] Financed in part by personal gifts for the memorial number for Mr. Weatherby.

Society, I am almost literally overwhelmed by the prothallia of many species. . . . I should like to express my appreciation of the Society and the courtesy of its members. It is a pity that more people are not aware of its existence and familiar with its work. Let's launch an educational campaign! Articles about ferns and fern allies, their culture and their protection, with pictures and appropriate drawings, would undoubtedly have a strong appeal to a large number of nature lovers." [signed] Lee Terry Williams.

This letter so well expresses the spirit in which the Society was founded that it is gratifying to record it coming from a new member. It is to be hoped that some of the helpfulness of the Society may be accomplished by local meetings and trips, both formal and informal, and also by correspondence between the members.—C. V. M.

Report of the Curator and Librarian for 1953

The notices of the sale of duplicate books and periodicals which have been carried in the Fern Journal have accounted for nearly a complete clearance of our duplicate literature. Since this program began in 1949, our sales have totaled nearly $300.00. Most of the transactions have been for amounts of two dollars or less and thus the total volume of these sales is indeed impressive. At least as important as this added revenue to the Fern Society treasury is the fact that we have been able to place this duplicate literature where it will be used. Just recently I have received two parcels of literature from members who wished to contribute these to our sale. Other members may also be interested in disposing of excess books for the benefit of the Society.

There have been several requests for non-technical literature on tropical ferns. The publication on Hawaiian ferns by Hubbard is the only one we have in our

library on this topic; it would be of interest if any others are available.

Mrs. Fern Crane has studied specimens from the Society's Herbarium of native species of *Dryopteris* for her recent publication on the spores of that genus. She has deposited in the Herbarium the set of collections upon which the illustrations in her paper were based.

Respectfully submitted,

ROLLA M. TRYON, JR., *Curator and Librarian*

REPORT OF THE NEW YORK-MONTREAL FIELD TRIP.—The Fern Society field-trip was scheduled to begin on August 14, 1953. In response to a suggestion from Dr. Benedict some of us arrived a day sooner and nine of us took an all-day trip to an area new to all. East of Pilot Knob ridge, bounding Lake George to the east, the Adirondacks extend perhaps six miles further as a series of heavily wooded ridges, between which are many small lakes. Due to a wrong turning we missed our objective, Crossett Pond, but we did visit Hogtown, South Bay (near the southern tip of Lake Champlain), and Podunk Pond. Recent cottage dwellers have preferred to rename the pond (the last refuge of the former tribe of Podunk Indians) Lake Nebo. No especially rare ferns were observed, but we did find *Osmunda cinnamomea* f. *auriculata* and an abundance of *Dryopteris Clintoniana*. We lunched in a beautiful grassy ravine, where a fine bank of maidenhair had furnished cattle fodder although close by *Cystopteris* and *Dennstaedtia* remained untouched.

On August 14, a group of 20 explored the vicinity of Pilot Knob. Dr. Benedict showed his fern beds, where a good many species have been planted, including some hybrids and some species not native to this area. This Pilot Knob area has been described recently by Dr. Benedict in the Journal. The drought of this year has affected some of the plants, and we did not find any of

the little botrychiums. *Lorinseria areolata,* male-fern, and some others have been naturalized in a moist area. A climb up Stewart's Ledge turned up a beautiful stand of walking-fern on a marble boulder. Later, we visited nearby swamps where we saw *Dryopteris Clintoniana* × *Goldiana* and a single clump of *D. Clintoniana* × *spinulosa* (found by Mr. Neidorf), perhaps the only form not seen before in this region. In all we saw during the day 34 ferns (including four hybrids), 4 lycopodiums, and 3 equisetums.

On August 15, we visited a large limestone quarry, near the home of Mr. William H. Mann, of Glens Falls, old enough to have good habitats for cliff-brake and other rock ferns. However, these have not as yet appeared. On a limestone talus nearby are fine stands of *Adiantum, Cystopteris bulbifera,* and walking-fern. Crossing into Saratoga County, seven of our ten cars reached Stark's Knob, an extinct volcano near Schuylerville, where we had our only view of *Pellaea atropurpurea* and *Asplenium cryptolepis.* The three cars that missed the turning arrived at Dr. Orra Phelps' home in Wilton early enough to get in some extra fern hunting. Under the leadership of Dr. Phelps and her sister, Mrs. Phoebe Lohnes, our party traversed the hills and swamps of the Phelps and Lohnes estates, rich in ferns of many types. One swamp in particular proved to be very rich in *Dryopteris cristata, D. Clintoniana, D. spinulosa,* and *D. intermedia,* together with intermediates between various pairs of these species. The site deserves more intensive study. Other interesting specimens noted included a tripinnate royal-fern, *Botrychium multifidum* var. *oneidense,* a small *Botrychium* (probably *matricariifolium*), and *Ophioglossum,* a new find for the region, turned up by Mr. Cyrus Darling after a laborious hands-and-knees search of a portion of a sedgy pasture. The party of about 30 was treated by Dr. Phelps to a de-

Lelf to right. Lower row: Kucyniak, Marshall, East, J. Benedict; second row: Ann Dunham, Morton, Raymond, Scudder, H. Bristow, A. Bristow; top row: Johnston, Emory, R. C. Benedict, Neidorf, Cinq-Mars. Group on summit of Mt. Johnson.

licious buffet supper at her home.

The next day, August 16, the main portion of the trip began, under the guidance of Dr. Phelps. The route took us through Warren and Essex Counties, through a considerable stretch of the higher Adirondack Mountains, along beautiful lakes and through narrow defiles. At Paradox Lake, we found for the first time on the trip *Dryopteris Goldiana* and *Athyrium pycnocarpon*. At Chapel Pond, the chief items of interest were *Cryptogramma Stelleri* (high up on a cliff), *Lycopodium inundatum*, and *Dryopteris dilatata*, the latter with *D. intermedia* and some intermediate specimens, presumably hybrids. At Lower Cascade Lake we saw a beautiful stand of *Polystichum Braunii*. From here on Dr. Stanley J. Smith took over as leader and showed us a ravine near Clintonville where five species of *Equisetum* grew close together—*E. hyemale, E. arvense, E. pratense, E. scirpoides,* and *E. sylvaticum*. As a climax for the day, the group visited the famous Ausable Chasm, as guests of Dr. Smith. Despite the commercial exploitation, the Chasm is a notable natural wonder, a deep ravine with precipitous sides, pinnacles, and rapids. The trip provides three-quarters of a mile of paths under overhanging ledges, many of them fern-clad, ending with a boat trip down the gorge for about the same distance. *Cryptogramma* is abundant on the walls, as is also *Cystopteris bulbifera*. The day ended with a quick change from hiking clothes, dinner at the Royal Savage, and our last night in the United States at Timberland Cabins.

On Monday, August 17, Dr. Smith took us to the edge of an arbor-vitae swamp near Plattsburg, where *Equisetum fluviatile* and *E. palustre* grew luxuriantly, together with occasional intermediates, putative hybrids between the two. Since we had some extra time on our hands this day, we detoured from the direct northern route to cross Lake Champlain on a ferry and bridges.

Woodsia ilvensis on Mt. Johnson

After lunch at a park on St. Albans Bay, Vermont, the 15 remaining members of our party proceeded north to St. Jean, Quebec, where we were graciously entertained at the home of Dr. Marcel Raymond. At dinner that evening we had the pleasure of the company of Dr. Raymond, Dr. Jacques Rousseau, Director of the Montreal Botanical Garden, Mr. James Kucyniak of the same institution, Dr. Lionel Cinq-Mars, of the Science Service Laboratory, and Dr. Eilif Dahl, of Oslo, Norway, who had come down from Montreal to greet us.

On August 18, Dr. Raymond, together with Messrs. Kucyniak and Cinq-Mars, guided us to a bog near Farnham [i.e. "fern hamlet"], the most eastern bog of the Montreal flood-plain, where many northern and southern plant species meet. Here we saw large stands of *Woodwardia virginica* at its most northerly station, and 19 other pteridophytes, including a find by Miss Laura East of *Botrychium multifidum* var. *intermedium*, a specimen of which has been deposited in the Montreal Botanical Garden. In the afternoon we visited Mt. Johnson. Near the base are magnificent stands of *Phegopteris hexagonoptera*, *Adiantum*, *Dryopteris Goldiana* and *Athyrium pycnocarpon*, which delighted the group. Since Goldie is known to have collected in this region, it has been suggested that this very spot may have been the locality for the collection of the type material of *Goldiana*. In a light sprinkle, the only rain during the whole tour, we climbed to the summit (685 feet) of Mt. Johnson, one of eight volcanic knobs standing up from the very level St. Lawrence flood-plain. Botanically, these knobs are of importance, as being almost the only areas in the Montreal region not under cultivation, and thus sanctuaries for native plants. The summit rewarded us with quantities of *Selaginella rupestris* and *Woodsia ilvensis*.

The climax of the tour, on August 19, was our visit

to the Montreal Botanical Garden. In the morning Dr. Raymond and Mr. Kucyniak guided us through seven of the 24 greenhouses, three of which were full of tropical ferns. We were guests of the Garden and the Director, Dr. Rousseau, at a delicious luncheon served in the Herbarium. In the afternoon we visited the outdoor plantation, a well-arranged series of gardens of native and cultivated plants. The Garden is to be congratulated on its really impressive display, both indoors and outdoors.

At least 60 species and varieties of native pteridophytes were seen in their natural habitats, together with 10 identified as hybrids. A large number of other species were seen in gardens and greenhouses. The whole trip must be considered as highly successful. The following members and friends participated in all or part of the trip: Dr. Fred Allen, Walter S. Allen, Mr. and Mrs. J. E. Benedict, Dr. and Mrs. R. C. Benedict, Alice Bristow, Helen Bristow, Mr. and Miss Daley, Ann Dunham, Mrs. F. G. Dunham, Laura East, David Emory (one of our younger members, who hitch-hiked all the way from Oberlin, Ohio), Beulah Glasgow, Mr. and Mrs. Robert Glasgow, Gertrude Douglas, Hannabelle Grant, Bessie Haas, Dr. James Johnston, Mrs. Charlotte Learned, Phoebe Lohnes, Mr. and Mrs. William H. Mann, Dr. Frank Marshall, Conrad Morton, Charles Neidorf, Laurence Phelps, Dr. Orra A. Phelps, Elsie Putnam, Anna Scudder, A. T. Shorey, Dr. Stanley J. Smith, Mr. and Mrs. Frederick Thorne, and Alice Waterhouse. We are grateful to Dr. Benedict, Dr. Phelps, Dr. Smith, and Dr. Raymond for their careful planning and leadership. The photographs were taken by Mrs. William Learned and are published by a contribution from Dr. Frank Marshall.—Anna E. Scudder.

REPORT OF THE MICHIGAN FIELD-TRIP.—It was the warm Sunday afternoon of August 30 that we met at Alpena, Michigan, on the shores of Thunder Bay in Lake Huron. Twenty-two people had come from eleven different states to spend six days and travel nearly one thousand miles together to see the ferns of Michigan. Dr. Clair Brown had come from Baton Rouge, La., Charles Neidorf from New York City, Conrad Morton from Washington, D. C., Gladys Clarke from Takoma Park, Md., Dr. and Mrs. Robert Lampton from Westminster, Md., Dr. R. C. Lommasson from Lincoln, Nebraska, David Emory from Oberlin, Ohio, Mrs. Stanley Simon from Cincinnati, Ohio, Jim Maysilles from Hanover, Ind., Mr. and Mrs. H. L. Swendsen from Milwaukee, Wis., Dr. Blanche McAvoy from Normal, Ill., Mr. and Mrs. A. R. Lord, from Palo Park, Ill., and Mary W. Diddell, though starting from Lansing, returned after the trip to her home in Jacksonville, Florida. There were six from Michigan—Mr. and Mrs. Dale Hagenah, of Birmingham, Dr. Rogers McVaugh, of Ann Arbor, Dr. Irving Knobloch, of Lansing, and Elsie Howells and Kathryn Boydston, of Niles. Donald Brown, of Ann Arbor, joined us on Monday for the remainder of the trip. We regretted that Dr. Warren H. Wagner, Jr., of Ann Arbor, the chairman of the foray committee, could not be present after so many hours spent in our behalf.

During the evening we had a brief meeting at which time Dale Hagenah told of plans for the week, arranged for cars and riders and gave each one of the group a nine-page mimeographed booklet giving detailed highway itinerary and time schedule, and listing the ferns and fern allies expected to be seen at each stop. At the outset, I must emphasize the careful and complete preparations for this foray, as this was no doubt the most important reason for its success. Not only had Dr.

Wagner and Dale Hagenah begun in early February to map the route and list the ferns, but had soon thereafter prepared a four-page prospectus of the trip with reservation blank attached, of which 150 copies were sent out to members living in Michigan and adjacent states, and to all who requested copies after reading notices in the Journal. In July, to complete the preparation, Dale Hagenah and Dr. M. T. Hall, of Cranbrook Institute, made a survey trip, checking all fern stations and timing the rides between the stops along the whole route. It was during this time that Dr. Hall made the exciting discovery of a fern new to Michigan which was kept as a surprise for the members of the foray.

Dale Hagenah, Dr. Wagner and Dr. McVaugh (who acted as guide and leader during our stay at the Biological Station) have the gratitude of every member of the foray and deserve also the thanks of the Society as a whole for the painstaking planning and successful completion of the Michigan foray. And not even mentioned yet is the fact that almost all of the stations of rare ferns and interesting or controversial hybrids were on our route entirely as a result of several years' scouting by these same men.

Our first morning was spent around the surprising and interesting sink-hole area near Leer. Here are many holes in the Devonian limestone formation, some as much as 100 feet deep and 300 feet across. Near the top of one we saw *Asplenium Trichomanes* in the only station for Michigan's lower peninsula. Those who scrambled to the bottom of one hole brought back tall fronds of *Dryopteris Filix-mas* and *D. Goldiana* and told of a large *Dryopteris* hybrid of as yet unidentified parentage. Though the weather was warm and the woods and countryside very dry, we made several other pleasant stops—in one, finding four Botrychiums, in another the hybrid

Dryopteris Clintoniana × *intermedia*. About five o'clock, we arrived at the University of Michigan Biological Station on beautiful Douglas Lake, in time to enjoy a refreshing swim. Though the summer students had all left, we were welcomed by Dr. A. H. Stockard and assigned to cabins. After supper we made good use of our opportunity for a social evening by meeting at the camp assembly hall, where Jim Maysilles showed us some fine colored slides of Mexico and Hawaii.

The whole of Tuesday was spent in the vicinity of Douglas Lake. Dr. McVaugh led us to Mr. Barth's garden and woods, to a lovely springy bog where *Dryopteris Robertiana* was seen in company of cranberries, sundews, gentians, *Chiogenes hispidula* and other lovely deep woods plants. At a later stop, we saw more Botrychiums and several of the group stretched out on the ground, the better to train their hand lenses on a patch of *Ophioglossum* growing on a small mound.

After crossing the Straits of Mackinac on Wednesday morning and checking in at our motel in St. Ignace, we travelled east to Cedarville, the individual cars making botanizing stops as desired. Our destination was some rock outcrops near Pickford, one of the most beautiful places of the whole trip. Though *Botrychium Lunaria* had been found here in July, it had by this date entirely disappeared due to the very dry weather. As we pressed farther back into the woods, they became ever more rocky. Before long we reached a place to dream of—the huge tumbled limestone boulders green with moss and actually dripping from all their cracks and crannies with hundreds of plants of *Asplenium viride*. These were accompanied by the shiny, erect plants of *Polystichum Lonchitis*. Other large rocks were topped with thick carpets of *Camptosorus*.

The next hour was to hold the "surprise stop" and we were eager to see which if any of the many specula-

LOWER ROW: SWENDSEN, MCVAUGH, MRS. SWENDSEN, MRS. HAGENAH, MAYSILLES, LOMMASSON, CLAIR BROWN; SECOND ROW: MORTON, DIDDELL, MCAVOY, CLARKE, MRS. LORD, BOYDSTON, HOWELLS, MRS. LAMPTON; TOP ROW: LORD, KNOBLOCH, DON BROWN, HAGENAH, NEIDORF, EMORY, LAMPTON. PICKFORD, MICH., SEPT. 2, 1953.

tions made concerning it might be correct. None were, and it was another high point of the week to see the amazement of all concerned when they were led to the eight plants of *Scolopendrium* discovered there in July by Dr. Hall!

On our way from this stop back to St. Ignace, Dr. McVaugh and some of the party made an unscheduled stop in another limestone area to look for *Woodsia oregana,* which he had seen there some time previously. Of course, Don Brown was on hand when one small plant was found! While looking for the *Woodsia,* we passed other luxuriant colonies of *Asplenium viride,* breathtaking in their beauty and quantity.

Our first stop to the west after leaving St. Ignace on Thursday morning was at Cut River Bridge where we took the stairway down and followed a path with a stream on one side and a fern bank on the other. *Dryopteris spinulosa* var. *fructuosa* was growing luxuriantly here, along with several other species. The whole day was interesting—one stop for *Selaginella selaginoides* yielded also great numbers of fringed gentian, grass of Parnassus, cranberries, orchids—another stop at lovely Tannery Falls where the delicate and fragile *Cryptogramma Stelleri* was found—and later at Scotts Falls, we all enjoyed seeing the luminous moss shining in the recessed cracks and fissures of the rocks.

Our plans for Friday morning at Marquette were slightly curtailed by rain, but we rode out to the black rocks at Presque Isle, on Lake Superior, and climbed around for some time finding tiny *Primula mistassinica,* small violets, and some ferns. Afternoon stops enabled us to add such rarities as *Dryopteris fragrans, Cystopteris fragilis laurentiana* and the hybrid *C. fragilis* × *bulbifera* (which is probably the same as *C. tennesseensis*).

Saturday morning, the last day of the trip we drove from Iron Mountain to a roadside park where Fume Creek tumbles over a cliff to make a lovely waterfall, and found *Pellaea atropurpurea* and *P. glabella* growing together as they do in no other place in Michigan. Higher up among the rocks an incised form of *Camptosorus rhizophyllus* was seen. *Woodsia Cathcartiana*, *W. obtusa*, and *Cryptogramma Stelleri* were found at our last official stop. Altogether about 60 species of ferns and fern allies were seen during the trip.

It seemed hardly possible as we separated at noon, some to return home, some to extend their trip, and some to go on to Madison, that six short days before most of us had been strangers to each other. To see so many ferns in their Michigan homes would have been a lot; to see with them all their lovely tree and shrub and plant companions was even more; to enjoy mile upon mile of forest-bordered highway, the evergreens accentuating the diverse beauty of the deciduous trees added much; and to have also, thrown in, as it were, many small jewel-like lakes and sea-scapes on three of our Great Lakes—well, to have been one of the 23 to make this trip was to be lucky indeed.—KATHRYN BOYDSTON.

REPORT OF NEW JERSEY MEETING.—The concluding field assembly of the Fern Society for 1953 was a "double feature" event on October 24, with both features deserving high praise.

The first visit was to Anderson's Fern Nurseries, in Short Hills, N. J. Picture 14 large greenhouses, each 100 feet long by 18 feet wide, entirely devoted to the raising of many species of ferns from spores, except for a small portion set aside for "asparagus fern." In the houses were all stages from pans of solid green prothallia to 20 inch pot plants of *Cibotium Schiedei*, the "king of ferns." A total of over 80 different species and varieties was seen, all types which are capable, in

varying degrees, of being grown as house plants. Most of these are classed as "table-ferns" and are sold to florists, to be used in mixed plantings, when they are still much less than half mature size. The majority of the different kinds are native in the subtropical areas of the northern hemisphere. Most of them show foliage which is presumably much like that of their wild ancestors, but one genus, *Pteris,* is present in a wide variety of horticultural forms. A dozen or so come from far enough north in the Asiatic region as to be potentially hardy garden species in latitudes from New York City southward.

Our leaders were Mr. J. F. Anderson and his daughter, Mrs. Dale G. Oechler. Mr. Anderson has been raising plants for 73 of his 82 years, and has been a fern specialist for the past 55 years. Fifty years ago there were a good many commercial raisers of table-ferns. Now he is the only one who devotes himself entirely to these plants. His interest and enthusiasm for ferns is his explanation for his persistence. At any rate his yearly product is numbered in the hundreds of thousands of plants, and shipments go all over the United States and even as far as Hawaii.

Anderson's ferns are sold on a quantity basis, in flats of 99 small clumps per flat, or in potted form in dozen lots and up to thousand lots. At my request, Mr. Anderson has written that although they "do not solicit retail orders, they are glad to take care of anyone dropping in. The price on $2\frac{1}{4}$" table-ferns per dozen, 8–10 best varieties, is $3.60 if called for; $4.50 packed, charges collect, and $5.00 per dozen plants, parcel postage prepaid." For the benefit of anyone who may like to try those potentially hardy, the following list is given: *Aspidium* [*Polystichum*] *tsussimense, Cyrtomium falcatum, C. falcatum* var. *Rochefordianum, C. Fortunei, Lastraea* [*Dryopteris*] *hirtipes, Lastraea* [*Dryopteris*] *lepida,* and *Lygodium scandens* [*japonicum?*]. For the

Clara Hires, R. C. Benedict, Alma Stokey, Walter S. Allen, Mistaire Laboratories, Millburn, N. J., Oct. 24, 1953

more southern states, *Onychium japonicum*, two *Pellaea* species, and some of the *Pteris* (forms of *P. cretica* and *P. serrulata*) may be included.

Visitors at the meeting rejoiced to take home as souvenirs little plants of the distinctive bird's-nest-fern (*Asplenium nidus*) and were invited to help themselves to another from the general stock.

The second visit of the day was to Mistaire Laboratories, in Millburn, N. J., as guests of Miss Clara Hires. We were shown first a series of Mr. Charles Neidorf's superlative photographs, enlargements of fruiting fern leaves. Year by year Mr. Neidorf is augmenting his collection by illustrations of additional species. We hope to begin regular publication of these in the Journal.

Prof. Alma G. Stokey, our new Honorary Member, exhibited cultures of 14 different kinds of rare and interesting prothallia of ferns from all over the world. She has devoted years of research to the differences among the prothallia of various fern families and other types.

The third exhibit was concerned with the growing of fern prothallia and orchid seedlings commercially under sterile laboratory conditions. Miss Hires started in with this work as an assistant to Prof. Lewis Knudson of Cornell University, then continuing it first as a hobby and later as a business, applying bacteriological techniques in a practical way to provide sterile cultures for college botany courses and commercial growers. Her assistant, Mrs. Tierney, explained the intricacies of the greenhouse mechanisms and the various techniques for sterilization and control of the environment, particularly illumination.

Later, Miss Hires talked on her work with fern spores, begun in 1938 and continued since with the aid of several assistants. She began drawing, photographing, and describing spores as received in order to report to grow-

ers and to have permanent records; later these spore studies were checked against authentic herbarium collections. A large number of photomicrographs of spores made by Mr. Philip O. Gravelle were exhibited, and moving pictures of spores slowly rotating made by Mr. Julius Weber. The latter show all sides of the spores, including angles not usually recognized, for under ordinary static examination, spores tend to come to rest always on the same side.

Refreshments were served later to the group by Miss Hires, who deserves a great deal of credit for her work in organizing and promoting the meetings both at Anderson's and Mistaire Laboratories. The attendance was very large, with a registration close to 80, thus making this one of the largest, if not the largest, Fern Society meeting ever held.—R. C. BENEDICT.

FIELD TRIPS FOR 1954.—Supplementing the preliminary mimeographed list of eight possible trips and meetings during 1954, word has come from a number of members of willingness to lead trips in other localities. They are listed briefly below. No dates are indicated but it may be expected that the trips will be possible sometime from late May through September. In every case, interesting species, sometimes rare ones, are indicated as among the ferns which may be expected. Requests for further information should be addressed to the prospective leader, with a return envelope for reply.

Mr. W. L. Dix, 801 Crown St., Morrisville, Pa., writes that he will be ready to go out with any *one* [his italics] who will write at least ten days in advance. Northeastern Pennsylvania.

Dr. Mildred E. Faust, 501 University Place, Syracuse, will be ready to go to the Jamesville hart's-tongue station, if there is interest. This central New York station has other interesting species.

Dr. Robert K. Lampton, 22 Edgehill Road, Lancaster, Pa., will be ready to lead "a trip or so" in his Pennsylvania neighborhood, and also into Carroll County, Maryland, where he finds the *Dryopteris* situation puzzling. Dr. Lampton is raising many sporelings and may "have young plants to give away later if members want them."

Mr. Edward N. Shields, R. D. 4, Siesta Key, Sarasota, Fla., (winter address) will be ready to lead a group in the northern Catskill region.

Central States Field Trip. The Central States Section of the Botanical Society of America will hold its field-trip between June 15 and 20, starting at the University of Arkansas, Fayetteville, Arkansas. Members of the Fern Society are invited to attend. Further information may be obtained from our new Vice-President, Prof. Dwight M. Moore, Department of Botany, University of Arkansas, Fayetteville, Arkansas.

Florida Field Trips and Meeting. Mr. John Beckner, 736 Myrtle Way South, St. Petersburg, Florida, has accepted the Chairmanship of the Committee to plan and carry out field-trips and a meeting for the presentation of papers at the 1954 meeting of the American Institute of Biological Sciences. The AIBS meetings are scheduled for Sept. 3–5. The Fern Society field-trip will be a few days in advance of the Gainesville meeting. As part of the special Committee, the following have been asked to serve: Mrs. W. D. Diddell, Mrs. J. M. Stifler, Mr. L. J. Brass, and Mr. E. M. Shields. Anyone interested may obtain a bulletin of information about the plans for the trips and meetings. Titles of papers to be presented should be sent to Mr. Beckner well in advance. Florida is in a class by itself in the wealth and distinctiveness of its fern species, and consequently the field-trips should be of interest to all.—R. C. BENEDICT.

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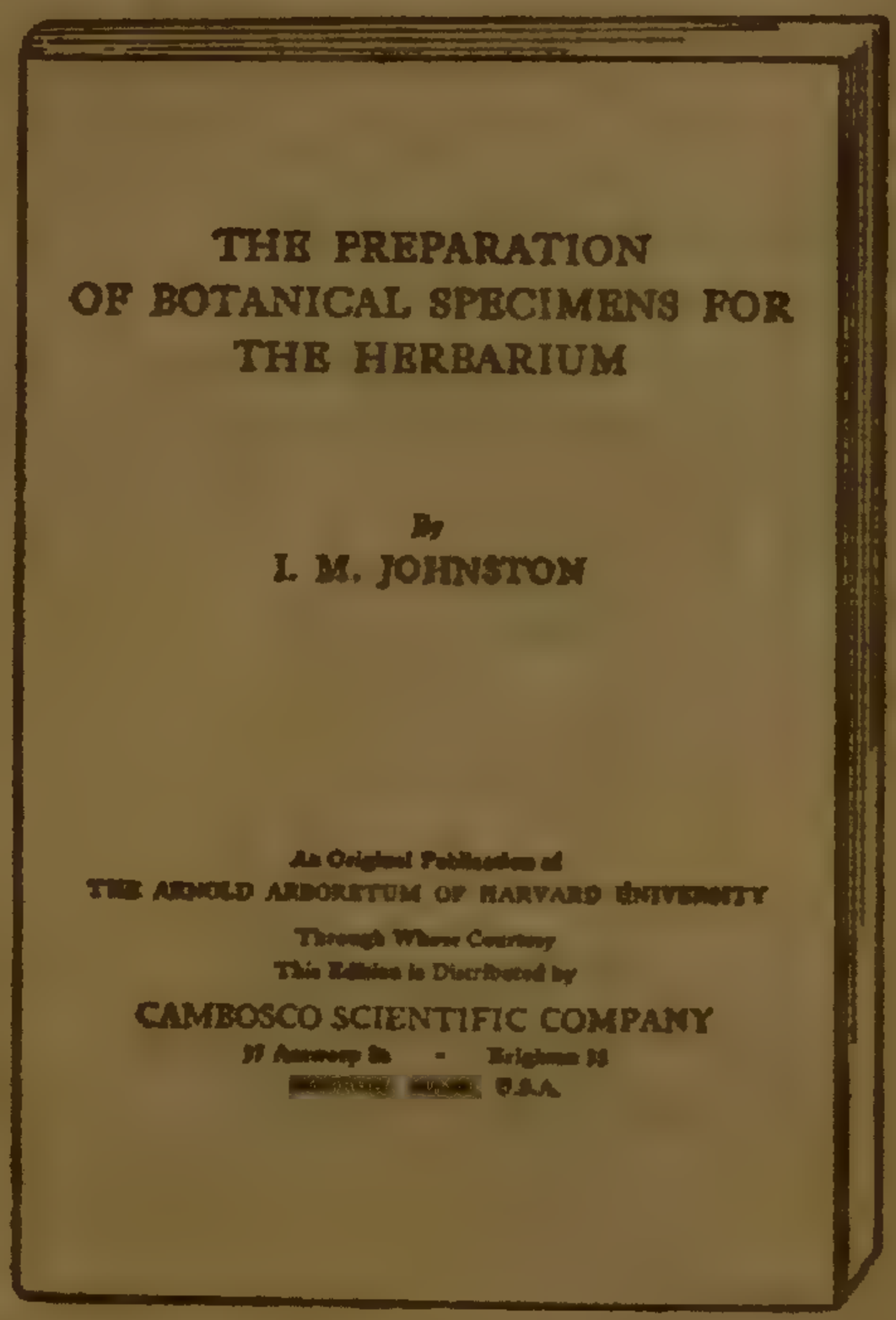

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American Fern Journal

VOL. 44 APRIL–JUNE, 1954 No. 2

Ecological Observations on Pteridophyta in the Kangra Himalaya

BY E. A. C. L. E. SCHELPE

The Kangra Himalaya is a part of the main Himalayan range situated south-east of Kashmir. Two of the major valleys of this area (between Long. 77° 5′–77° 40′ E. and Lat. 31° 55′–32° 30′ N.) were visited by the author both before and after the onset of the monsoon during an expedition to these mountains in the summer of 1952. During these travels an intensive study of the distribution of pteridophytes in this area was made. Herbarium specimens of the species referred to in this paper are now housed in the British Museum (Natural History), London.

Observations were begun in the Beas River Valley (Kulu Valley) in dry pre-monsoon weather in mid-May. At the beginning of June the expedition travelled up the Parbati Valley and established a base camp at 12,800 feet altitude in the Dibibokri Nal, which leads off the Parbati Valley to the north. After the onset of the monsoon, the expedition returned in mid-July along the Parbati Valley. Subsequently further observations were made in the Beas Valley.

CLIMATE

In general, the rainfall in this western part of the Himalaya is considerably lower than that at comparable altitudes in the eastern part of the range such as Sikkim. At Kulu (4000 feet altitude), in one of the larger val-

[Volume 44, No. 1, of the JOURNAL, pp. 1–48, was issued April 8, 1954.]

leys of the Kangra Himalaya, the mean annual rainfall over a period of ten years (1942–1951) was 46.17 inches. Two periods of maximum rainfall occur each year, the first between January and March and the second from July to September. The period from April to June is fairly dry and from October to December very dry weather occurs. At Kulu, a complete drought in October or November is frequent. Unfortunately, no continuous records of rainfall in the higher valleys appear to be available. At the expedition's base camp (12,800 feet altitude) in July frequently no rain fell on days when it was reported to be raining heavily in the conifer forests lower down the Parbati Valley. According to local information, the conifer forests receive a greater rainfall than the valley floor of the Beas River.

The higher peaks in this range are covered with snow throughout the year and in the dwarf Juniper zone, at about 12,800 feet, snow is said to cover the ground from October until May. In the conifer forests, about 8000 feet, snow coverage of the ground is reported to last from January until March. The floors of the larger valleys, below 5000 feet, receive very little snow.

VEGETATION TYPES

In the wide valley of the Beas River in the environs of Kulu (Sultanpur), most of the more level land is arable and is under cultivation. Above this arable land, scrub of varying density ascends to the ridges where groups of pines often occur. The river flood-plains and also the banks of tributaries support alder woodland (*Alnus nitida*) or tall mesophytic scrub. Further up the valley, above 5000 feet, orchards have been planted on some of the arable land, and, yet further, extensive conifer plantations occur about the valley floor around Manali (6000 feet).

In contrast, the lowest reaches of the Parbati Valley

have little or no flood-plain and run in a gorge of steep mountain slopes colonized by open succulent *Euphorbia*-scrub or shorter and more dense mixed scrub in which species of *Berberis* are frequent constituents. At about 5000 feet, patches of pine forest (*Pinus Roxburghii*) interspersed with terraced fields become prominent in the landscape. Cedars (*Cedrus deodara*) become more frequent with increasing altitude and at about 7500 feet altitude a mixed forest of conifers, mainly pine (*Pinus Wallichiana*) and Cedar and deciduous trees (e.g. *Aesculus indica*) becomes common on the steep southern banks. In contrast, the northern banks at this point are more sparsely clad with trees and appear to be rather drier. Above 8000 feet, the terraced cultivated fields thin out and a belt of conifer forest extends up to the tree line of 11,000 feet. At higher altitudes in this zone, spruce (*Picea Smithiana*) becomes more prominent and, above 10,000 feet altitude, firs (*Abies spectabilis*) dominate the upper fringe of the conifer forests. Above 10,000 feet, the conifers are often mixed with a maple (*Acer ?* sp.) which occasionally forms pure stands.

Above the tree line, the vegetation is a mozaic of tall *Rhododendron campanulatum* scrub or low *Rhododendron cephalanthum* scrub on the steeper slopes, patches of silver birch (*Betula utilis*) woodland and grassy meadows. Above this belt, a dwarf juniper (*Juniperus pseudosabina* Hook.) begins to appear in quantity on grassed-over screes on east to south aspects. On longer-shaded colder slopes, *Rhododendron cephalanthum* forms extensive areas of short dense scrub. Both these small shrubs have an upper altitude limit in this area of about 13,000 feet, above which a landscape of scree and moraine boulders with short herbaceous vegetation between predominates up to the rock-faces and glaciers of the high peaks.

Arable Areas

A variety of ferns occurs in the arable lands, usually on earthbanks among the terraced fields and on the stone walls among the habitations. *Ceterach Dalhousiae* (Hook.) C. Chr. is the most frequent fern, often growing together with *Onychium japonicum* (Thunb.) Kunze and *Pteris cretica* L. In drier positions, *Pellaea nitidula* (Wall.) Baker was seen growing about the bases of small scrub thickets. Dry but shaded stone walls provide a habitat for *Cheilanthes persica* (Bory) Mett., and more moist embankment walls often house large colonies of *Hypolepis punctata* (Thunb.) Mett. Moist ditches between fields and along watercouses in the townships offer a moist, though frequently exposed, habitat for a number of ferns including the following:

Diplazium polymorphum (Wall.) Presl	(o)[1]
Cyclosorus dentatus (Forsk.) Ching	(o)
Hypolepis punctata (Thunb.) Mett.	(f)
Onychium japonicum (Thunb.) Kunze	(c)
Pteris cretica L.	(o)
Thelypteris brunnea (Wall.) Ching	(o)

Only newly developed fronds were seen in May on the *Diplazium*, *Hypolepis*, and *Onychium*, and it appears that these species are deciduous in this habitat.

Above and among the arable fields, a short open scrub frequently occurs. On dry north-aspect hillsides in this scrub, both *Cheilanthes persica* (Bory) Mett. and *Ceterach officinarum* Lam. & DC. were found in crevices and on ledges of rock outcrops. At the time of collection in the dry, hot, pre-monsoon weather, the fronds of this *Ceterach* were inrolled, a feature occurring to a lesser degree in *Ceterach Dalhousiae* (Hook.) C. Chr.

Some of the arable land has been converted into apple, pear and cherry orchards. In some orchards at 6000

[1] The following abbreviations are used to indicate frequencies: a, abundant; c, common; l.c., locally common; f, frequent; l.f., locally frequent; o, occasional; r, rare.

feet, *Pteridium aquilinum* (L.) Kuhn var. *Wightianum* (Ag.) Tryon was prominent, and *Diplazium polymorphum* (Wall.) Presl and *Pteris cretica* L. were occasionally seen around boulder-bases about the margins of such orchards. In one waterlogged apple orchard, *Equisetum debile* Roxb. occurred in quantity during the monsoon rains.

River Flood-plains

Many areas of the wide flood-plain of the Beas River are occupied by alder woodland. In the gravelly soil of this habitat, large colonies of *Hypolepis punctata* have developed. In the flood-plains of the smaller rivers, a shorter and denser scrub is often present; the ground layer of this vegetation occasionally includes *Pteris vittata* L. and *Woodwardia unigemmata* (Mak.) Nakai in addition to the common *Hypolepis punctata.* After the onset of the monsoon, large quantities of a sterile *Marsilea* were found growing in almost stagnant backwaters.

Valley Floor Conifer Plantations

The conifer plantations in the neighborhood of Manali have a ground layer vegetation in which pteridophytes are very prominent, the most frequent species being *Ceterach Dalhousiae, Diplazium polymorphum, Onychium contiguum* Hope, *Pteris cretica,* and *Selaginella chrysocaulis* (Hook. & Grev.) Spring. Along the banks of small streams in deep shade in one of the cedar forests, occasional colonies of *Pteris Wallichiana* Ag. were seen. The boulders and rock walls in these forests are largely inhabited by a different pteridophyte community comprising the following species:

Adiantum venustum Don (l.f)
Asplenium Trichomanes L. (f)
A. varians Wall. ex Hook. & Grev. (o)
Leucostegia pulchra (Don) J. Smith (f)

Polypodium sp. aff. *P. microrhizoma* Clarke (f)
Polypodium sp. (sterile) (r)

It is interesting to note that fronds only appeared on the *Leucostegia* and *Polypodium* after the monsoon rains had begun.

On the margins of open glades among the conifer forests a number of ferns were seen growing about the bases of large boulders in varying degrees of shade afforded by the trees and isolated shrubs. These included *Athyrium puncticaule* (Blume) Moore, *Onychium contiguum, Polystichum nigropaleaceum* (Christ) Diels, *Pteris cretica* and *Thelypteris Levingei* (Clarke) Ching. In more shaded situations, *Asplenium Adiantum-nigrum* L., *Athyrium proliferum* Moore, and *Dryopteris odontoloma* (Moore) C. Chr. occurred in similar habitats.

In some of the steeper glades between cedar forests, artificially constructed water-courses leading to primitive water-mills were seen. Even in the dry season preceding the monsoon, the banks remained perpetually wet and were colonized by a wide variety of pteridophytes listed below.

Athyrium puncticaule (Blume) Moore (o)
Diplazium polymorphum (Wall.) Presl (c)
Equisetum arvense L. (o)
Osmunda Claytoniana L. var. *vestita* (Wall.) Milde (o)
Polystichum nepalense (Spreng.) C. Chr. (r)
P. Thomsonii (Hook. f.) Bedd., *forma* (o)
Thelypteris Levingei (Clarke) Ching (f)

DRY SCRUB

The slopes of the lower reaches of the Parbati Valley have been colonized by different types of scrub vegetation of various heights and densities. Extremely dry spurs where very little scrub has developed are extremely poor in pteridophytes. Occasionally colonies

of *Selaginella sanguinolenta* (L.) Spring f. *indica* (Milde) Alston and *Ceterach officinarum* were found on ledges and in crevices of huge cliffs along the route. A few colonies of *Adiantum incisum* Forsk. and *Hypolepis punctata* were also seen in this dry belt growing around the bases of boulders in some sheltered localities.

In the scrub proper many of the ferns appeared to be confined to the more shaded areas directly underneath small shrubs while others grew more luxuriantly in such situations. The following species were seen in this vegetation type:

Ceterach officinarum Lam. & DC. (c)
Dryopteris crenata (Forsk.) C. Chr. (o)
Dryopteris marginata (Wall.) Christ (o)
Lygodium sp. (r)
Pellaea nitidula (Wall.) Bak. (o)
Pteris cretica L. (o)
Pteris vittata L. (r)

Occasionally a few moist shaded walls and earthbanks in this zone were colonized by *Adiantum Capillus-veneris* L. A few individuals of *Diplazium polymorphum* and *Woodwardia unigemmata* were also found along the banks of some of the small streams that occur in this zone.

PINE-CEDAR ZONE

Between the patches of conifer forest, areas of scrub and terraced fields are quite common features of the mountain slopes. On the more exposed spurs, ferns such as *Asplenium Trichomanes, A. Adiantum-nigrum, Ceterach Dalhousiae, Onychium contiguum, Pteridium aquilinum* var. *Wightianum,* and *Pteris cretica* may be found growing about the bases of boulders. *Diplazium polymorphum* is quite prominent along the hedges of the fields and around boulder clumps. Denser scrub occurs in some of the more sheltered gullies in this zone and in such shaded habitats *Adiantum venustum, Asplenium*

varians, *Cheilanthes subvillosa* Hook., *Pteris asperi-caulis* Wall. and *Thelypteris Levingei* make their appearance.

Some open, comparatively dry pine woodland is encountered in this zone and infrequently *Gymnopteris vestita* (Wall.) Underw. and *Pellaea nitidula* occur with the more common *Asplenium Trichomanes* on earth-banks in this vegetation. The closed pine and cedar forests in this zone offer a wide variety of habitats varying in humidity and density of shade. The following species were recorded in the field layer of these conifer forests:

Adiantum Edgeworthii Hook. (l.f.)
A. venustum Don (l.f.)
Asplenium Adiantum-nigrum L. (o)
A. Trichomanes L. (f)
Athyrium sp. aff. *A. flabellatum* (Clarke) Tardieu (f)
Ceterach Dalhousiae (Hook.) C. Chr. (c)
Coniogramme affinis (Wall.) Hieron. (r)
Diplazium polymorphum (Wall.) Presl (o)
Dryopteris odontoloma (Moore) C. Chr. (o)
Onychium contiguum Hope (c)
Selaginella chrysocaulis (Hook. & Grev.) Spring (l.f)
Thelypteris Levingei (Clarke) Ching (o)
Woodwardia unigemmata (Mak.) Nakai (l.f)

At higher altitudes, *Athyrium Schimperi* Moug. becomes common in some forest localities in this zone while *Coniogramme affinis* becomes increasingly frequent with increasing altitude. Moss covered boulders on the floors of these forests harbor a number of humicoles, such as *Adiantum venustum*, *Asplenium varians*, *Leucostegia pulchra*, *Polypodium nudum* (Hook.) Kunze, *Pyrrosia mollis* (Kunze) Ching, and at higher altitudes *Polypodium amoenum* Wall.

The mixed conifer-deciduous forests (ca. 8000 feet) have a field layer considerably richer in pteridophytes. Epiphytes are conspicuously absent; only one plant of

Polypodium nudum was seen growing epiphytically upon an old *Ilex* trunk. The following species were recorded on the floor of this type of forest and on the boulders within it:

FOREST FLOOR:
Asplenium Adiantum-nigrum L. (o)
A. Trichomanes L. (c)
Athyrium acrostichoides (Swartz) Diels (o)
A. Mackinnonii Hope (f)
A. puncticaule (Blume) Moore (o)
Coniogramme affinis (Wall.) Hieron. (c)
Diplazium polymorphum (Wall.) Presl (f)
Dryopteris odontoloma (Moore) C. Chr. (f)
Onychium contiguum Hope (f)
Polystichum nigropaleaceum (Christ) Diels (o)
Pteris cretica L. (o)
Thelypteris Levingei (Clarke) Ching (c)

BOULDERS:
Adiantum venustum Don (c)
Asplenium Adiantum-nigrum L. (o)
A. Trichomanes L. (c)
A. varians Wall. ex Hook. & Grev. (c)
Polypodium amoenum Wall. (o)
P. clathratum Clarke (l.f)

Open wet glades were not uncommon at the lower edges of this type of forest and large quantities of *Equisetum arvense* and some colonies of *Osmunda Claytoniana* var. *vestita* were seen in these habitats.

PINE-SPRUCE-FIR ZONE

This zone, which extends from an approximate altitude of 8500 feet to the tree-line at 11,000 feet, is composed largely of pine-spruce forests with an admixture of firs at the upper limits and also a number of deciduous trees. As in the lower conifer forests, ferns are also prominent in the undergrowth and include the following species:

Adiantum venustum Don (l.c.)
Asplenium Trichomanes L. (o)
Athyrium acrostichoides (Swartz) Diels (o)
A. Boryanum (Willd.) Tagawa (o)
A. Mackinnonii Hope (f)
A. flabellulatum (Clarke) Tardieu (l.f)
A. Schimperi Moug.[2] (f)
A. sp. aff. *A. flabellulatum* (Clarke) Tardieu (c)
Botrychium virginianum (L.) Swartz (r)
Coniogramme affinis (Wall.) Hieron. (f)
Dryopteris sp. (sterile) (o)
Onychium contiguum Hope (o)
Polystichum nigropaleaceum (Christ) Diels (o)
Thelypteris Levingei (Clarke) Ching (o)

At higher altitudes, above 10,000 feet, *Onychium contiguum* rapidly becomes scarce, while *Adiantum pedatum* L., *Cryptogramma Brunoniana* Wall., *Cystopteris fragilis* (L.) Bernh., *Diplazium squamigerum* (Mett.) Christ and *Dryopteris fibrillosa* (Clarke) Hand.-Mazz. become more frequent in the undergrowth. A number of humicoles were also found on boulders in these forests, and are listed below.

Adiantum venustum Don (f)
Asplenium Trichomanes L. (o)
A. varians Wall. ex Hook. & Grev. (l.f)
Coniogramme affinis (Wall.) Hieron. (f)
Cheilanthes Dalhousiae Hook. (o)
Polypodium amoenum Wall. (f)
P. loriforme Wall. (o)
P. malacodon Hook. (l.f)

Two epiphytes were found in this zone. Only one colony of *Polypodium clathratum* was seen on an old pine-trunk, but numerous plants of *Leucostegia pulchra*

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[2] *Athyrium Schimperi* has a creeping rhizome; that of *A. flabellulatum* should be "dressé, à frondes en rosette," according to Mme. Tardieu. As most of the Schelpe specimens are without rhizomes, it is difficult to identify them with certainty.—A. H. G. Alston.

occurred as epiphytes on the deciduous trees. The fronds of the *Leucostegia* appear only after the onset of the monsoon rains. Clearings and forest margins in the lower part of this zone are populated by *Athyrium Mackinnonii, Diplazium polymorphum, Pteridium aquilinum* var. *Wightianum* and *Thelypteris Levingei.* In the more moist situations *Osmunda Claytoniana* var. *vestita* and *Equisetum arvense* are frequently seen. At higher altitudes many of these clearings are the result of landslides, especially near deeply eroding rivers. Among various other herbs which had colonized such areas *Athyrium Boryanum, A. acrostichoides, Dryopteris fibrillosa* and *Gymnocarpium remotum* (Hayata) Ching are found.

Moist to wet boulder-strewn gullies overgrown with *Viburnum*-scrub are encountered occasionally among the forests. In such habitats *Osmunda Claytoniana* var. *vestita* is locally common, associated with *Diplazium squamigerum, Polystichum moupinense* (Franch.) Bedd. and *Thelypteris Levingei. Osmunda* also forms large colonies along streams running across small alpine meadows among the forests about their upper limits. At altitudes along the tree-line, boulder clumps in the grasslands harbored a few ferns including *Asplenium Trichomanes, Athyrium Boryanum, Cystopteris fragilis,* and *Polystichum Prescottianum* (Wall.) Moore.

SILVER-BIRCH WOODLAND

A few ferns were seen on the boulder-strewn floor of this rather open woodland. The only species recorded were *Cryptogramma Brunoniana, Cystopteris fragilis, Polypodium bicolor*[3] and *Polystichum Prescottianum.* A few colonies of *Equisetum arvense* were also found in some wet ground around the margin of this woodland.

[3] Polypodium **bicolor** (Takeda) Alston, comb. nov.
Polypodium excavatum var. *bicolor* Takeda, Notes Bot. Gard. Edinburgh **8**: 279. 1915.

RHODODENDRON-JUNIPERUS ZONE

The vegetation of this zone is composed of a mozaic of alpine meadows, scree grassland, and a number of shrub communities. On north to west aspects, areas of *Rhododendron campanulatum* scrub up to ten feet high occur usually on the more level ground while a short scrub (up to two feet high) of *Rhododendron cephalanthum*, occasionally admixed with *Rhododendron lepidotum*, occurs on steep rubble slopes among cliffs. On the warmer south to east aspects, *Juniperus pseudosabina* forms an open low scrub up to three feet high on rocky scree grassland. In some of the more dense patches of *Rhododendron campanulatum* scrub ferns are prominent in the undergrowth, including the following species:

Athyrium acrostichoides **(Swartz) Diels (o)**
A. Filix-femina (L.) Bernh. var. *dentigera* (Wall.) Bedd. (f)
Cystopteris fragilis **(L.) Bernh. (o)**
Dryopteris fibrillosa (Clarke) Hand.-Mazz. (f)
Polystichum Prescottianum (Wall.) Moore (f)

Cryptogramma Brunoniana was frequently seen on moss-covered boulders in this scrub.

Although *Equisetum arvense* was the only pteridophyte found in the higher parts of the *Rhododendron cephalanthum* short scrub, a number of ferns were seen about the lower limits of this vegetation in more sheltered situations. The species recorded were *Cryptogramma Brunoniana*, *Cystopteris fragilis*, *Dryopteris barbigera* (Moore) O. Ktze. and *Polypodium bicolor*. This *Polypodium* is particularly abundant in boulder scree in the lower parts of this zone where it is deciduous. A single plant of *Polypodium clathratum* was seen in a deep crevice of a cliff in this zone.

Landslides appear to be of frequent occurrence among the rhododendron scrubs. After some period while the rubble slopes become somewhat stable, they may be col-

onized by some of the smaller ferns, e.g. *Cryptogramma Brunoniana*, *Cystopteris fragilis* and *Woodsia* sp. aff. *W. Hancockii* Baker.

In comparison to the rhododendron scrub, the dwarf juniper scrub has a poor pteridophyte flora. Only *Botrychium Lunaria* (L.) Swartz and *Cryptogramma Brunoniana* were found in this community. *Cryptogramma Brunoniana*, *Cystopteris fragilis* and *Dryopteris barbigera* are occasionally found among the clumps of huge boulders which occur between patches of this scrub.

The open boulder-strewn grasslands and grassed screes among these different types of scrub are also inhabited by pteridophytes. Usually the ferns occur around the bases of boulders and are more frequent in wetter ground. The species found in such habitats are listed below.

Athyrium acrostichoides (Swartz) Diels (l.f)
Cryptogramma Brunoniana Wall. (o)
Cystopteris fragilis (L.) Bernh. (o)
Equisetum arvense L. (l.f)
Polystichum lachenense (Hook.) Bedd. (o)
P. moupinense (Franch.) Bedd. (o)
P. Prescottianum (Wall.) Moore (f)

Above the meadows and screes gaunt gneissic cliffs rise up steeply. In the crevices and on sheltered moist ledges in the rock faces of these cliffs, two interesting ferns were encountered. *Cryptogramma Stelleri* (Gmel.) Prantl was found to be locally frequent in a number of wet shaded crevices, where its brittle rhizome grew among damp moss mats. In deep but more exposed crevices, colonies of *Woodsia alpina* (Bolton) Gray were occasionally seen at about 13,000 feet. In the shallower crevices the mature fronds of this species are considerably smaller.

ALPINE ZONE

Above the upper limit of the juniper and rhododendron scrub, only three ferns were seen among the boulder-strewn grasslands on old moraines and screes. *Polystichum moupinense* was found around boulder bases up to an altitude of 14,000 feet and *Cystopteris fragilis* and *Polystichum Prescottianum* up to an altitude of 13,400 feet.

DISCUSSION

PAUCITY OF EPIPHYTIC SPECIES

The most striking feature of the pteridophyte flora in this western part of the Himalaya is the marked paucity of epiphytic species, both in variety and quantity. Kashyap (1925) noted that the paucity of epiphytic ferns increased westwards from the Kumaon and recorded that epiphytic orchids and ferns were absent in the drier inner valleys, e.g. the Sutlej. Mehra (1939) records that epiphytic ferns "thickly clad the tree trunks and branches" in Mussoorie with an annual rainfall of 86 inches (i.e. almost double that recorded at Kulu).

In the Kangra Himalaya, only one locally frequent epiphytic fern, *Leucostegia pulchra*, and single epiphytic colonies of *Polypodium clathratum* and *P. nudum* were found. It was observed that the epiphytic *Leucostegia* appeared to prefer the trunks of deciduous trees as substrata. This corresponds with the observations of Mehra (1939) in the Mussoorie district. In the higher valleys of the Kangra division, conifers far outnumber the deciduous trees, none of which have thick, persistent spongy bark. However, since only a few of the individual deciduous trees bear epiphytes, it seems probable that the comparatively low rainfall is largely responsible for the paucity of epiphytic ferns in the Kangra Himalaya, rather than a lack of suitable host trees.

THE DECIDUOUS HABIT

A number of authors have noted the fact that many ferns are deciduous, losing their foliage either in winter in temperate regions or in dry seasons in more tropical areas. The development of fronds after the onset of the rains from rhizomes dormant during the dry season has been recorded by Christ (1910), Mehra (1939), and others. In the Kangra Himalaya, it appears that both drought and low winter temperatures affect the periodic dormancy of some of the ferns of this region. However, a number of species are evergreen judging by the presence of old live fronds in the spring. In some of the deciduous species, young fronds were being developed before the onset of the monsoon, while in others no fronds were visible until the rains had begun at the end of June. It would appear that those deciduous ferns which produce fronds only after the onset of the rains are activated by increased humidity in addition to an increase in temperature in the spring. This temperature increase alone seems to be more important in starting the other group of deciduous ferns into growth. In considering the latter group though, it must be remembered that some rain does fall before the monsoon, but not with the intensity of the monsoon rains.

Evergreen species form a large part of the pteridophyte flora in the lower, comparatively drier and warmer valleys. All these species are terrestrial and include *Adiantum Zollingeri, Ceterach Dalhousiae, C. officinarum, Cheilanthes persica, Pellaea nitidula* and *Selaginella sanguinolenta.* The conifer forests also harbor a number of terrestrial evergreen species, which include *Adiantum venustum, Asplenium Adiantum-nigrum, A. Trichomanes* and *Polystichum nigropaleaceum.* Among the humicoles in this vegetation belt the leathery-leaved, evergreen *Polypodium loriforme* and *Pyrrosia mollis* also occur.

All the ferns in the Alpine and *Rhododendron* zones are apparently deciduous and were observed producing new fronds in June before the monsoon rains. *Equisetum arvense* in these two zones appeared in large quantities after the rains had begun, though only a signle fertile stem was seen, this in short rhododendron scrub at 12,000 feet altitude in mid-June.

In the coniferous forests and in the scrub between them, the terrestrial species *Coniogramme affinis, Cryptogramma Brunoniana, Diplazium polymorphum, Onychium contiguum*, and *O. japonicum* were producing young fronds in the pre-monsoon period in early June. After the monsoon rains had begun another group of terrestrial forest ferns began to develop fronds, notably the species of *Athyrium* and also *Diplazium squamigerum* and *Thelypteris Levingei.* It is interesting to note that fronds were being produced before the monsoon on plants of *Athyrium puncticaule* and *Thelypteris Levingei* which were growing on the wet banks of watercourses at 6000 feet altitude. Among the forest humicoles growing on boulders, *Polypodium amoenum* began to produce fronds in the pre-monsoon period, but no new fronds were observed on plants of *Polypodium bicolor* or *P. clathratum* until after the onset of the monsoon. The most striking example of dormancy terminated by the monsoon rains was provided by the epiphytic *Leucostegia pulchra* which although seemingly absent in the pre-monsoon period, rapidly produced numerous fronds shortly after the rains began.

SUMMARY

The distribution of pteridophytes in the various vegetation types in the Kangra Himalaya is described. The deciduous habit in these ferns and the paucity of epiphytic species in this area are discussed.

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REFERENCES

CHRIST, H. 1910. Die Geographie der Farne. Jena.

KASHYAP, S. R. 1925. The vegetation of the western Himalayas and western Tibet in relation to their climate. Journ. Indian Bot. Soc. 4: 327–334.

MEHRA, P. N. 1939. Ferns of Mussoorie. Panjab Univ. Bot. Publ. 1–29.

The Hay-scented Fern, Dennstaedtia punctilobula

C. V. MORTON AND CHARLES NEIDORF

The hay-scented fern is one of the commonest and best known of the ferns of the northeastern United States. The illustration, a photograph by the junior author, was made from material collected near Yonkers, New York. It shows very well two of the important characteristics—the sorus and the hairs.

The sori are terminal on the anterior branches of the veins and are marginal in origin, although turned at maturity toward the lower side of the frond. The indusia are cup-shaped and originate as a low rim which grows until it assumes a spherical shape. The margins are later forced apart by the growing sporangia, but the indusia are never "dehiscent," as they have been described. When young, the margins of the indusium are ciliate; however, the long, hyaline hairs are soon deciduous.

The second characteristic of this species, which separates it from all casually similar species in the United States, is the pubescence. The main rachis and also the other axes bear conspicuous hairs of two sorts; both are elongate and multicellular, but one is tipped by an acute, colorless cell (acicular type) and the other by a rounded, colored cell (glandular type). Conard, in his classic work on this species,[1] distinguishes a third type of hairs, termed moniliform, most obvious on juvenile fronds.

The hay-scented fern has been konwn since 1803, when it was first described by Michaux. During the next fifty years, it was referred to seven different genera until it was finally placed in Bernhardi's genus *Dennstaedtia* (1801) by Moore.[2] Most early botanists (and some later ones too) followed Willdenow in placing it in the genus *Dicksonia* L'Héritier (1788), because of a certain superficial similarity between the cuplike indusium of *Dennstaedtia* and the bivalvular one of *Dicksonia.* There is probably no real relationship between the two genera. *Dicksonia* is a genus of tropical tree-ferns; it has an erect, stout caudex with a large complicated vascular system. The stipes above the base have a large number of free vascular strands. *Dennstaedtia* has a slender, creeping rhizome[3] with a simple solenostele. The stipe has a solitary, U-shaped strand. There are undoubtedly conspicuous differences in anatomy from *Dicksonia* throughout the plant.

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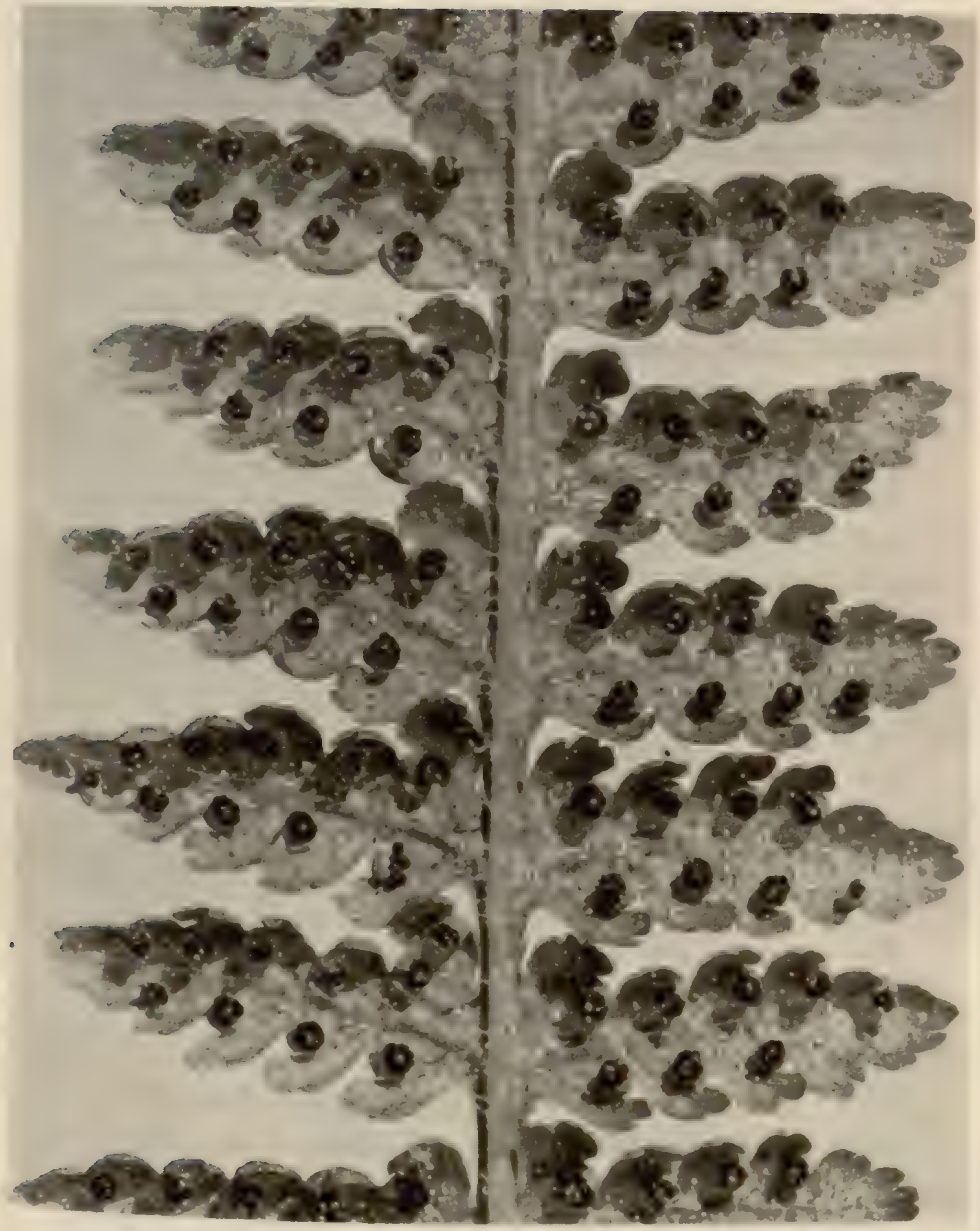
[1] The Structure and Life-History of the Hayscented Fern, by H. S. Conard. Carnegie Inst. Washington Publ. 94. pp. 1–56. *pl. 1–25.* 1908. This careful treatise can be highly recommended as a model for students of other groups.

[2] As a matter of fact, it is not absolutely certain even yet that *punctilobula* is congeneric with *D. flaccida* (Forster) Bernhardi, the type of *Dennstaedtia.* The matter needs further investigation.

[3] Which bears hairs only and is devoid of flattened scales. This is an obvious distinction from *Athyrium, Dryopteris,* or other plants somewhat superficially similar in the field.



Dennstaedtia punctilobula

The sporangia of *Dennstaedtia* need further study. It has been claimed by the eminent authority F. O. Bower[4] that the annulus in *Dennstaedtia* is inconstant, sometimes typically polypodiaceous (vertical and interrupted), sometimes slightly oblique and more or less continuous (i.e. cyatheoid). This may conceivably be an erroneous observation or interpretation. It is certainly very strange and a further investigation ought to be made. If the variation is found to occur it should be studied quantitatively, to determine if it is characteristic of certain species or merely a casual or rare abnormality. Another matter for a student is the development of the sporangia. Conard states that the sporangia develop in basipetal succession on the receptacle in *D. punctilobula*, i.e., are "gradate," a primitive and unusual character for the Polypodiaceae. The observation should be verified, for Bower states that other species have a "mixed" type of sorus, more or less typical of Polypodiaceae.

Pilot Knob Supplement

R. C. BENEDICT

The observations regarding the fern flora of the Pilot Knob area, reported in the April–June issue of the Fern Journal for 1953, can be supplemented along several lines as a result of the past season's work.

A CORRECTION

The correction has to do with the walking-fern and the emphasis placed on its supposed anomalous occurrence on non-calcareous rocks. The boulders on which it grows *are* of limy rock, metamorphosed to marble condition. My geology was mistaken. Throughout the Adirondacks

[4] The Ferns 2: 271. 1926.

the ancient, pre-paleozoic rock-base offers not infrequent outcrops of this marble as part of what is known as the Grenville formation. This fact has encouraged me to hope for the discovery of other lime-loving ferns, particularly on the moister, eastern slopes of the Pilot Knob Ridge.

NEW FINDS

The new additions to the Pilot Knob fern flora are three hybrids: *Dryopteris Clintoniana* × *marginalis*, *D. Clintoniana* × *spinulosa* (turned up by Mr. Neidorf), and *D. Clintoniana* × *Goldiana*, the origin of which is described in a separate brief article.

NEW NATURALIZATION PLANTINGS

New naturalization plantings to be reported include a number of northeastern species, and three from farther south. As was noted in the article cited above, plantings of hardy native species have been made of species which have not so far been found in the immediate area. Such introductions have been made into habitats which are believed to provide favorable soil and moisture conditions, and in which there are already growing naturally species commonly associated. The hope is that the introduced plants may take hold and succeed without special further care. The northern species planted were *Dryopteris Goldiana* and *D. Filix-mas*, *Thelypteris simulata* from New Hampshire and Maine, *Athyrium pycnocarpon*, and *Lorinseria areolata*. The plants from a southern source were *Dryopteris celsa* and *celsa* × *intermedia* from Dismal Swamp, and *D. ludoviciana* from Yeehaw, Florida. Whether these latter types will fare well in a northern winter remains to be seen.

The continuance of drought conditions did not make this the most auspicious summer for the establishment of such plantings. This year the drought began late in May

and continued for two months with not more than an inch of rain, and thereafter, until October 1 with much less than average precipitation. Because of unusually heavy spring rains, deeper rooted plants, such as the trees, did not seem to suffer in the past summer as much as the surface herbaceous vegetation. And it may be reported that the new introductions, as of early October, seemed to have come through successfully.

INSTALLATION OF FERN GARDEN

A good deal of effort was devoted to the installation of a fern garden to provide a site for the maintenance of a good representation of native and other species, and also, to provide a site in which various hybrids and other critical forms could be grown comparatively. The garden was a new development. Up to this year I had been satisfied to watch local ferns in their naturally selected sites, except for a small assemblage of *Dryopteris* species and hybrids which had been installed in a pit of some depth north of a stone wall. Here unfortunately, although the plants had persisted, tree-root competition and other factors had prevented good growth.

With the imminence of a Fern Society visit, with retirement providing more time, and the realization that not far away, my wood-lot presented numerous specimens of *Dryopteris spinulosa*, a moisture-loving species, I decided that my garden site was there just waiting for the labor of development. The place selected is along a shaded narrow depression which extends from some acres of swampy woods for a quarter of a mile until it empties in Lake George. During spring and early summer the swamp is full of water which the draw or slough carries off gradually until the swamp has been drained of its surplus. Across narrower parts of this draw I piled check-dams of clay and logs and rock to hold back some of the spring water. From the lower bed of the

depression, I dug the few inches of black, friable soil and piled this along the sides for the fern beds. The whole swamp and drainage stretches are underlain by dense, solid clay which has a cover of not more than six inches of usable soil. Only in this upper layer is there any real penetration of the roots of the elms and alders, and arbor vitae which provide most of the shade. Despite its clay base, the blackish topsoil shows a friable, crumbly texture.

The actual beds were made by piling this soil, taken from the drainage bottom, along the sides, with rocks and logs to provide successively higher "terraces." The lower beds will be well soaked during the spring run-off; the higher reaches should provide satisfactory places for the species which would not welcome such immersion. Manual labor—mine—using simple tools, pick mattock, shovel, wheel barrow, crowbar, etc., cut the trees, arranged the logs, and filled in the dirt.

Before the summer was over at least 50 different kinds of ferns had been planted, and the initial soil space had become so crowded that a doubling or quadrupling of area is needed. On the planting list are 32 species of native ferns, 8 probable hybrids, and 9 exotics (Japanese and English), a bounty from Mr. Mann. A naturally occurring small rock-outcrop, with convenient fissures seemed ideal for a number of rock species, including some hart's-tongue sporelings, from Mr. Mann's crop from Jamesville spores.

Some special provisions were made for the osmundas and ostrich-fern with a view to finding out whether record plants might not be grown. In the clay bottom, fairly deep holes were dug, then filled with humus and top soil, even some chicken manure, with good-sized plants set out in the top layers.

Finally, what was last summer an unfailing water supply was developed in the form of a dug well. For

some years I had been digging clay from one place until a six-foot depth had been reached. My objective had been the possibility of reaching finally a porous layer under the clay, and thereby tapping the ground water. With new plantings to need water, the digging was continued, and about seven feet down the porous layer was found, and I had my well. It did not give a large flow, but always contained about eighteen inches of water, and provided a supply to be dipped up as needed.

The end of the season of 1953 leaves me in the state of the baseball fan whose team has done less than was hoped during the season: Wait till next year!

Some Pteridophytes from Tamaulipas[1]

AARON J. SHARP

During the summer of 1950, the writer, accompanied by Efraím Hernández X., the late William B. Fox, and Howard A. Crum, collected plants in Tamaulipas, and again in the summer of 1952 he visited the same region with a party including E. Hernández X, R. E. Shanks, and John N. Wolfe. Less than a month was spent in the field, principally at cloud-forest altitudes south of the Tropic of Cancer in southern Tamaulipas.

A few collections of ferns were made on the eastern slope of the Sierra Madre Oriental along the road from Ciudad Victoria to Jaumave. Additional species were collected near the Paso de Calabazas on the Río Sabinas at E. W. Storms' ranch north of El Limón. However, most of the ferns were collected at or near Frank Harrison's "Rancho del Cielo" on the eastern slope of the Sierra de Guatemala above Gómez Farías.

[1] Contribution from the Botanical Laboratory, The University of Tennessee, N. Ser. 156.

The slope above Ciudad Victoria is relatively dry with scrubby, xeric vegetation of small trees and shrubs. Most of the ferns grow in the crevices of exposed limestone.

The collecting area at the Paso de Calabazas was the river bank and flood-plain of the Río Sabinas, where the atmosphere remains relatively humid.

The Rancho del Cielo area has been described in a general way by Hernández *et al.* (1951) and Sharp *et al.* (1951). It is located at an elevation of 3000–5000 feet on the eastern slope of the Sierra and the topography is broken karst. The vegetation is a rich, mesic mixture of genera, some of which would be considered "temperate" and some "tropical."

The state of our knowledge concerning the pteridophyte flora of this region is indicated by the following list, where, of 43 species mentioned, 22 (marked with an asterisk) are reported for the first time from Tamaulipas and one, *Botrychium dissectum* var. *tenuifolium*, is reported for the first time from Mexico.

The list is arranged by families according to Christensen.[2] The name of each species is followed by collection and, in many instances, distribution data. Altitudes are approximate.

OPHIOGLOSSACEAE

*BOTRYCHIUM DISSECTUM Spreng. var. TENUIFOLIUM (Underw.) Farwell. Rancho del Cielo, 5000 ft. Known before only from southern U. S.

BOTRYCHIUM VIRGINIANUM L. Rancho del Cielo, 4500 ft.

SCHIZAEACEAE

ANEMIA ADIANTIFOLIA (L.) Swartz. Río Sabinas, 500 ft.

*ANEMIA PHYLLITIDIS (L.) Swartz. Rancho del Cielo, 4500 ft.

HYMENOPHYLLACEAE

*TRICHOMANES KRAUSSII Hook. & Grev. Rancho del Cielo, arboreal, 4000–5000 ft.

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[2] In Verdoorn, Manual of Pteridology, 1938.

POLYPODIACEAE

SUBFAMILY DENNSTAEDTIOIDEAE

*DENNSTAEDTIA GLOBULIFERA (Poir.) Hieron. Rancho del Cielo, 4000 ft.

SUBFAMILY DAVALLIOIDEAE

*NEPHROLEPIS OCCIDENTALIS Kunze. Rancho del Cielo, 4000 ft.

SUBFAMILY PTERIDOIDEAE

*PTERIS CRETICA L. Rancho del Cielo, 5000 ft.

*ADIANTUM FEEI Moore. Rancho del Cielo, 4500 ft. Not before reported north of Veracruz.

*A. POIRETII Wikstr. Rancho del Cielo, 4500 ft.

*A. TENERUM Swartz. Río Sabinas, 500 ft.

A. TRAPEZIFORME L. Río Sabinas, 500 ft.

CHEILANTHES AEMULA Maxon. Rancho del Cielo, 4500 ft.

C. INTRAMARGINALIS (Kaulf.) Hooker. Rancho del Cielo, 4500 ft.

C. MEIFOLIA Eaton. Rancho del Cielo, 5000 ft. Common in Tamaulipas. Restricted to northern Mexico (S.L.P., N.L., Coah.).

*C. PYRAMIDALIS Fée. Rancho del Cielo, 4500 ft.

LLAVEA CORDIFOLIA Lag. Rancho del Cielo, 4000–4500 ft.

NOTHOLAENA ASCHENBORNIANA Klotzsch. Near Ciudad Victoria, approximately 2000 ft.

N. COPELANDII C. C. Hall. Near Ciudad Victoria, approximately 2000 ft.

N. SINUATA Lag. Near Ciudad Victoria, approximately 2000 ft.

SUBFAMILY VITTARIOIDEAE

*VITTARIA FILIFOLIA Fée. Rancho del Cielo, 4500 ft.

SUBFAMILY BLECHNOIDEAE

BLECHNUM OCCIDENTALE L. Rancho del Cielo, 4000 ft.

*WOODWARDIA SPINULOSA Mart. & Gal. Rancho del Cielo, 4500 ft. Closely allied to *W. fimbriata* J. E. Smith (*W. chamissoi*) of the Pacific coastal area of the U. S.

SUBFAMILY ASPLENIOIDEAE

ASPLENIUM FRAGRANS Swartz. Rancho del Cielo, 4000 ft.

A. MONANTHES L. Rancho del Cielo, 4500 ft. Common in Latin America and also reported from a small area in South Carolina by Blomquist (1948).

*A. PRAEMORSUM Swartz. Rancho del Cielo, 4000 ft. Not before reported from north of Veracruz and Morelos.

SUBFAMILY DRYOPTERIDOIDEAE

*DRYOPTERIS EQUESTRIS (Kunze) C. Chr. Rancho del Cielo, 4500 ft.

*D. PALEACEA (Swartz) Handel-Mazzetti. Rancho del Cielo, 4500 ft. This fern is not common in eastern Mexico.

*D. SUBTETRAGONA (Link) Maxon. Río Sabinas. 500 ft.

PHANEROPHLEBIA UMBONATA Underw. Rancho del Cielo, 4500 ft.

*TECTARIA INCISA Cav. Río Sabinas, 500 ft.

*THELYPTERIS DENTATA (Forsk.) E. St. John. Rancho del Cielo, 4000 ft.

SUBFAMILY POLYPODIOIDEAE

POLYPODIUM ANGUSTIFOLIUM Swartz. Rancho del Cielo, 4000–4500 ft.

P. LANCEOLATUM L. Rancho del Cielo, 4000 ft.

*P. PACHYRHIZON Christ. Rancho del Cielo, 4000 ft. Not previously reported north of Puebla and not common there.

P. PLEBEJUM Schlecht. & Cham. Rancho del Cielo, 4500 ft.

P. PLESIOSORUM Kunze. Rancho del Cielo, arboreal, 4500 ft.

P. POLYPODIOIDES (L.) Watt var. MICHAUXIANUM Weatherby. Rancho del Cielo, 4000 ft.; near Ciudad Victoria.

SUBFAMILY ELAPHOGLOSSOIDEAE

ELAPHOGLOSSUM *sp.* Rancho del Cielo, arboreal, 4000 ft.

LYCOPODIACEAE

*LYCOPODIUM PITHYOIDES Schlecht. & Cham. Rancho del Cielo, arboreal, 4000 ft. Rare in Mexico, not before reported north of Oaxaca and Veracruz.

*L. TAXIFOLIUM Swartz. Rancho del Cielo, arboreal, 4000 ft.

SELAGINELLACEAE

SELAGINELLA EXTENSA Underw. Rancho del Cielo, arboreal, 4000–4500 ft.

*S. PILIFERA A. Braun var. PRINGLEI (Baker) Morton. Rancho del Cielo, 4500 ft. Known previously only from western Texas, New Mexico, Chihuahua and San Luis Potosí.

SUMMARY

Forty-three species of pteridophytes were collected recently in Tamaulipas. Twenty-two of these have not been listed before from Tamaulipas, and one, *Botrychium dissectum* var. *tenuifolium*, has not been reported before from south of the United States.

Sincere thanks are extended to Conrad V. Morton, U. S. National Museum, whose assistance with identifications and distribution have been invaluable.

UNIVERSITY OF TENNESSEE

BIBLIOGRAPHY

Blomquist, H. L. 1948. *Asplenium monanthes* in South Carolina. Amer. Fern Journ. **38**: 171–176.

Hernández X., E., Howard Crum, Wm. B. Fox, and A. J. Sharp. 1951. A Unique Vegetational Area in Tamaulipas. Bull. Torrey Bot. Club **78**: 458–463.

Sharp, A. J., E. Hernández Xolocotzi, Howard Crum, and Wm. B. Fox. 1951. Nota florística de una asociación importante del suroeste de Tamaulipas, México. Bol. Soc. Bot. Méx. **11**: 1–4.

Verdoorn, Frans, et al. 1938. Manual of Pteridology. Martinus Nijhoff, The Hague.

Fern Hunting in New Zealand

WILLIAM W. CADBURY

For many years it had been my ambition to visit the "Lands down under" and at last my opportunity came in 1949. After forty years of residence in China, my retirement was overdue. I left Hongkong in February, taking the steamer to Sydney, Australia, whence I flew to Auckland, in the North Island of New Zealand. I spent 70 days in the Dominion from early April until the middle of June. The land of the "long white cloud" was first discovered by Abel Tasman in 1642, but he remained there less than two months. It was again discovered by Captain Cook in 1769.

DESCRIPTION OF THE COUNTRY. This dominion of the British Empire measures about 1000 miles in length by 280 miles in width. In area it corresponds to the states of Pennsylvania, Maryland, Delaware, and Rhode Island combined. Geographically it lies between longitude 166° and 179° East and Latitude 34° and 48° South. Like Australia, it is a remnant of a great continent—Antarctica. Transferred to the Northern Hemisphere its latitude would correspond to Italy in Europe or in the

United States from the northern tip of Maine to North Carolina. The maximum annual temperature varies from 95° to 98° F. with an annual average temperature of 50° to 59°. Maximum sunshine is found in Nelson with a record of 2500 hours. Winters are generally mild with only one ground frost in the north, but in the south 192 frosts occur during the year. Many parts of the southern Alps have a rainfall of 200 to 300 inches a year. The driest region is the inland basin of Otago in the south, near Dunedin, with only 13 to 15 inches a year.

The country is largely mountainous, less than one fourth of the land lying below 650 feet. The two major divisions, North and South Islands, are divided into east and west by the main mountain axis. A plain stretches west of the Southern Alps. The highest peak here is Mt. Cook, 12,349 feet above the sea level. In this region there are three extensive glaciers: The Tasman, Franz Josef, and Fox. West of these are the rainforests. In North Island there are several volcanoes, notably Mt. Ruapehu. The lakes in the south, in the vicinity of Queenstown, are famous resorts, as are also the hot springs in the southern part of North Island.

The earliest collections of New Zealand ferns were made by Joseph Banks and Dr. Daniel Solander, who accompanied Captain Cook in his first voyage to the Antarctic in 1769. Later came Joseph Hooker, who described 119 ferns and fern allies in his Flora Antarctica, published in 1852. More recently we have the works of George M. Thomson, F. C. Field, and T. F. Cheeseman's Manual of New Zealand Flora. Finally, there is Miss Marguerite Crookes' revised edition of H. B. Dobbie's New Zealand Ferns.[1] In this work Miss Crookes lists

[1] 4th ed., 1951. The nomenclature in this book follows that of Copeland, Genera Filicum, in general.

153 species of ferns native to New Zealand, of which 55 are endemic; others occur also in Australia and the Pacific Islands; and six are world wide in their distribution. There are also 14 members of the Lycopodiaceae. My own collection contains 96 species.

The paucity of American literature dealing with the ferns of New Zealand may be judged by the fact that in a careful review of the Indices of the Fern Bulletin (1893–1911) and of the American Fern Journal (1910–1952) there occur only 17 references to the ferns of New Zealand.

GEOGRAPHICAL AREAS VISITED. Starting in Auckland, North Island, I was introduced to Mr. J. D. MacPherson, Director of the Parks Department. I visited the greenhouses and especially the remarkable collection of New Zealand ferns growing in the so-called "fern pit." Here are several species both native and introduced, including the unique *Loxsoma Cunninghamii*, a genus with this single species, *Cyathea Smithii*, and *Dicksonia fibrosa*, two of the most common of the nine native tree-ferns which constitute such a conspicuous feature of the New Zealand landscape, especially of the western regions. Then there was the king-fern, a species of *Marattia* (*M. salicina*), which grows to a great size in the north, and *Todea barbara*, a member of the Osmundaceae. Here also was *Asplenium bulbiferum* and *A. lucidum*, the former growing to a great size.

In the outskirts of Auckland is the Le Roy Forest, a bit of virgin forest. Here were found the primitive *Tmesipteris tannensis* hanging in festoons from the branches of trees, *Pteris macilenta* and *P. comans*, *Blechnum membranaceum*, many filmy-ferns, *Lygodium articulatum*, a native climbing fern, and *Ctenitis decomposita*. To Miss Crookes I am indebted for the identification of these species, as well as many others collected in other parts of the country.

Travelling further south to Rotorua—the hot springs country—there was to be found *Lycopodium volubile* and *L. cernuum*, *Gleichenia microphylla*, and *Dicranopteris linearis*.

Still further south in North Island, on the banks of the Otureri River, I came across a beautiful grove of trees. Here, on Vinegar Hill, were to be found *Blechnum filiforme*, *Microsorium pustulatum*, and *Sticherus Cunninghamii* (the umbrella-fern).

In the gardens of Palmerston North I found *Arthropteris tenella*.

Wellington is the capital of the Dominion and a few days stay here gave me the opportunity of visiting the botanical department of the University, where Messrs. Healy and Gates kindly identified several of my specimens.

Again at Wanganui on the west coast, I visited the Centennial Gardens, the greenhouse, and the beautiful public park. From the Catchment Area, connected with the water supply from outside this city, I was able to procure samples of the remarkable kidney fern—*Cardiomanes reniforme*.

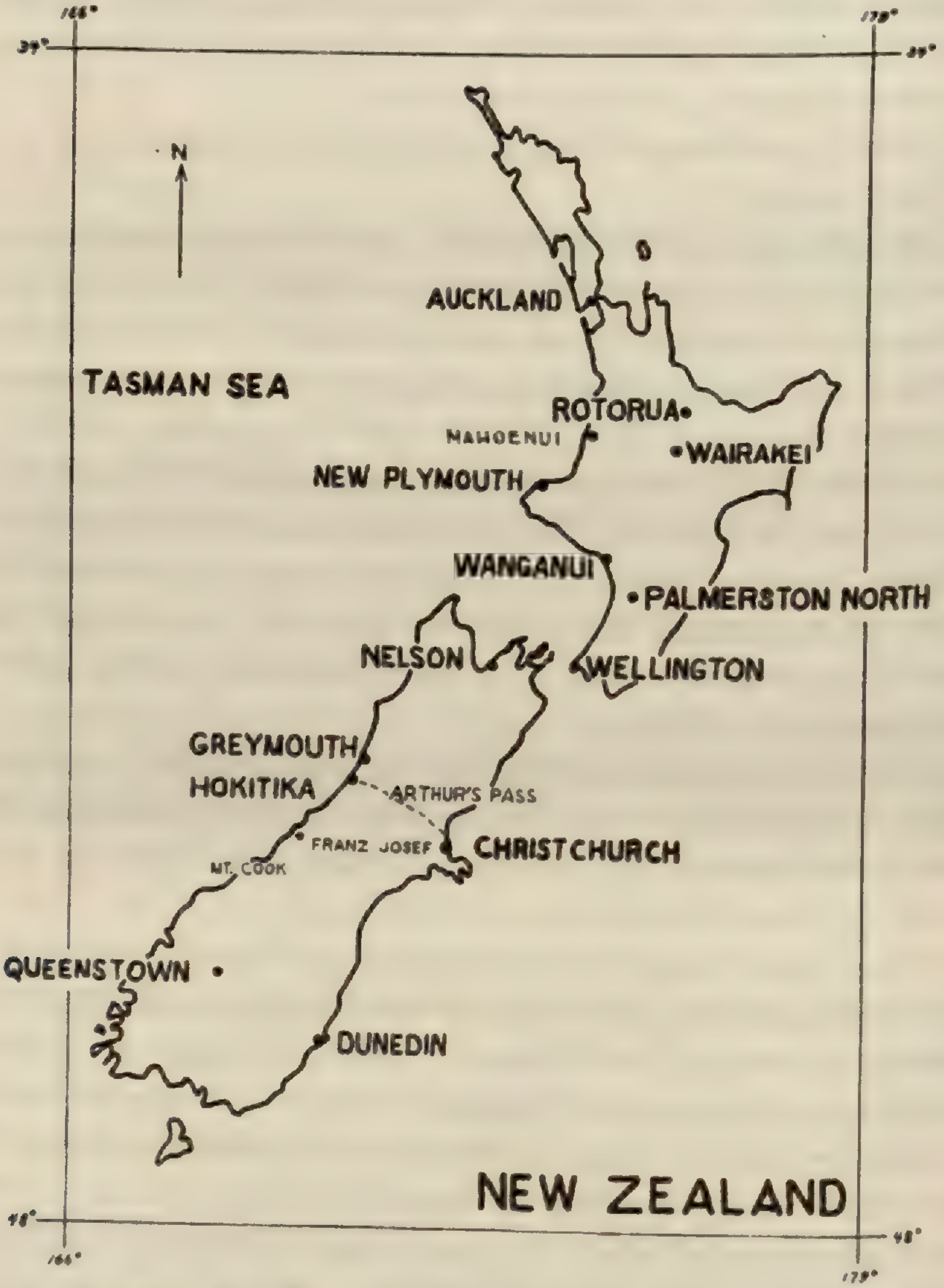
In South Island, at Nelson, I was fortunate to meet Mr. George Barltrop, whose fern garden contains 28 different species, all of which I was able to study and add to my collection.

Travelling southwest over the Hope Saddle and along the gorge of the Buller River to Greymouth, I observed great groves of tree-ferns of different species. *Lycopodium volubile* and *Blechnum procerum* were observed hanging in great masses from the steep sides of the road and also from branches of trees.

Turning south along the west coast, I passed Hokitika through the Waiho Gorge and the virgin rain forests to the Franz Josef and Fox glaciers. Here the branches

of the trees are literally covered with the beautiful filmy-ferns, of which I collected and identified no less than thirteen species.

It was also in these rain forests that the famous Prince-of-Wales-fern was found growing abundantly. This fern, *Leptopteris superba*, is the most beautiful of



MAP OF NEW ZEALAND SHOWING AREAS FROM WHICH THE FERNS DESCRIBED IN THIS PAPER WERE COLLECTED.

all New Zealand species, which (along with the allied species *Leptopteris hymenophylloides*) makes a vivid picture in one's mind. To quote from Dobbie: "No loom invented by man ever wove a fabric of such marvellous texture, nor can any feathers worn by a Prince of Wales compare with its exquisite crown of great sweeping plumes, the younger ones, of a translucent shining green, rising majestically in the center."

Crossing Arthur's Pass in the eastward direction, we made a stop at Otira station near the summit of the pass; later we reached Christchurch, on the east coast.

It was here that I had the good fortune to meet Professor A. Wall, now retired. He accompanied me to the cliffs known as Taylor's Mistake, rising above the Canterbury plain. Here I collected *Asplenium lucidum*, *Blechnum vulcanicum*, *Adiantum affine*, *Hymenophyllum sanguinolentum*, and *H. rarum*, *Ctenopteris grammitidis*, *Pleurosorus rutifolius*, *Cheilanthes Sieberi*, and *C. distans*.

At Canterbury University College, Mr. J. A. Veale, Lecturer in Botany, presented me with more than 20 herbarium specimens of New Zealand ferns.

In the South, on a drive from Dunedin along the Otago Peninsula, I collected *Microsorium diversifolium*, *Polystichum Richardii*, *Asplenium bulbiferum*, and *Blechnum discolor*.

One afternoon, Mr. George M. Simpson, an amateur enthusiast from Dunedin, drove me over 30 miles to Woodside in the Mangatua Hills, a thickly wooded area in the Domains. Here more than 15 species were collected, including *Adiantum hispidulum*, *Asplenium bulbiferum*, *A. flaccidum*, *A. Hookerianum*, *Blechnum fluviatile*, *B. lanceolatum*, *B. penna-marina*, *Grammitis Billardieri*, *Hypolepis distans*, *H. millefolium*, *Lycopodium densum*, *L. scariosum*, *L. volubile*, and *Pyrrosia serpens*.

One more side-trip was made from Dunedin to Queenstown in the south-west Lake district and a few more ferns were added to my collection from the Dart and Routebourn Valleys and the beech-forests in these regions. Among the ferns collected on this trip, there were *Asplenium flabellifolium*, *A. Trichomanes*, *Cyathea Smithii*, *Grammitis Billardieri*, *Histiopteris incisa*, *Hypolepis millefolia*, and *Paesia scaberula*.

In summarizing the more common species found in New Zealand, one may mention that there have been recorded 14 members of the Lycopodiaceae, 5 of the Gleicheniaceae, 22 Hymenophyllaceae, 9 tree-ferns (*Dicksonia* and *Cyathea*), 6 *Adiantum*, 4 *Polystichum*, 15 *Blechnum*, and 15 *Asplenium*. Many of the ferns of New Zealand are unique and very beautiful. No field to a plant lover is more rewarding than the forests of New Zealand.

MOORESTOWN, N. J.

Shorter Notes

REPORT ON A FERN GARDEN.—The American Fern Journal is a welcome magazine on my desk. Even the more technical articles are not without interest to the amateur who is scarcely equipped to profit fully from their perusal.

Because of its non-technical character, the article "The Ten Best Ferns for Northeastern Gardens," by Dr. Benedict, was of peculiar interest to me, especially because for several years I have made a hobby of growing ferns at my home in the village at Suffield, Connecticut.

I recall most pleasantly my visit a few years ago to Mr. Thurston's fern garden in Sharon, Connecticut.

My own venture, however, is not worthy of comparison with his; and yet it may be of interest and value to other fern lovers because of the limitations which I have voluntarily set for myself. I decided to attempt to grow no fern that is not native to Suffield and transferred from its "native heath" to my house. In spite of this limitation I have today 31 species, two varieties, and two hybrids growing around my house and in my rock gardens.

I am growing the first nine species on Dr. Benedict's list (*Dryopteris marginalis*, *Osmunda Claytoniana*, *O. spectabilis*, *Dryopteris Goldiana*, *Pteretis nodulosa*, *Polystichum acrostichoides*, *Adiantum pedatum*, *Onoclea sensibilis*, and *Athyrium Filix-femina*), as well as *Dryopteris intermedia* and *Osmunda cinnamomea*. The latter does especially well for me and elicits spontaneous admiration from neighbors and visitors. I certainly would place it among the ten best for amateur cultivators of ferns. For *Onoclea sensibilis* on the list I would substitute a fern that is not mentioned, surprisingly—*Athyrium thelypteroides*. It is easily grown, and, in my opinion, one of our most beautiful native ferns, especially when the sporangia are fully developed.

Other attractive ferns in my garden are: *Woodwardia areolata*, *W. virginica*, *Asplenium Trichomanes*, *A. platyneuron*, *Polypodium virginianum*, *Dennstaedtia punctilobula*, *Dryopteris cristata*, and *D. Phegopteris*. Additional ferns that I have growing are: *Botrychium dissectum* var. *obliquum*, *B. virginianum*, *Lygodium palmatum*, *Woodsia ilvensis*, *W. obtusa*, *Cystopteris fragilis*, *Dryopteris Thelypteris*, *D. simulata*, *D. noveboracensis*, *D. hexagonaptera*, × *D. Boottii*, *D. cristata* var. *Clintoniana*, *D. cristata* var. *Clintoniana* × *spinulosa*, *Camptosorus rhizophyllus*, and *Pteridium aquilinum*.—JESSE F. SMITH, *Suffield, Connecticut.*

A VISIT TO THE HOME OF JOHN CLAYTON.—In June, 1953, Dr. Wherry, Dr. Cadbury, and I were in southeastern Virginia and decided to pay a visit to the homesite of John Clayton, the early American botanist, the original discoverer of Interrupted-fern (*Osmunda Claytoniana*), Spring-beauty (*Claytonia virginica*), and many other of our wild flowers. The site was formerly in Gloucester County but is now in Mathews County, near the little settlement called Soles. Our route led to Yorktown and over the new bridge to Gloucester Point, and thence inland to Soles. The original Clayton house and extensive gardens have long since disappeared and there is now a farmhouse on the spot. However, a nearby garden club is planning to erect, at the old entrance, four brick piers connected by an iron fence and a wrought-iron sign showing two fronds of *Osmunda Claytoniana* and two plants of *Claytonia,* with Clayton's dates 1693–1773. We were most fortunate in finding Miss Jessie Hopkins, the designer of the memorial and the author of a recent paper on Clayton, right on the spot awaiting the arrival of workmen to start the construction. It was a pleasing opportunity of meeting Miss Hopkins and hearing first-hand details of her study of Clayton's life and work. It is gratifying that he is to be honored by this memorial.—HARRY W. TRUDELL.

CULTIVATION OF EBONY SPLEENWORT.—In reply to Mr. W. S. Johnston's enquiry[1] concerning the cultivation of ebony spleenwort (*Asplenium platyneuron*) I may say that *percolating* moisture appears to be indispensable—never stagnant moisture. Some other plants have the same requirement. For example, the widely distributed *Hamamelis virginiana* (witch-hazel) does not require it, but the very local *H. vernalis,* which

[1] This JOURNAL 43: 92. 1953.

stands up to eight feet tall in gravelly bottoms, is stunted, if it survives at all, after transplanting to gardens of ordinary soil, whether rich or poor. *Hepatica* has similar requirements.

Here in Missouri, with an average annual rainfall of 38 inches, ebony spleenwort is one of our commonest ferns along rather steep brushy roadsides facing north, with plenty of elevation further back, down which moisture seeps into the zone of the ferns. An apparent exception is a specimen (my no. 5342 from Iron County, Mo.) which I presented to the National Herbarium some years ago, a deeply toothed form found on a flat shoulder among granite rocks. But here the soil was a perfectly drained gritty leafmold, from 3 to 5 feet above the surface of a lake, surrounded by ridges 75 to 100 feet high.

Percolating moisture is a condition to find; in a garden it is almost impossible to create.—ALBERT CHANDLER.

NOMENCLATURE OF THE OAK-FERNS.—Since my assignment of the Oak-ferns to the genus *Currania*[1] has not been concurred in by others, it seems desirable to present the reasons for this procedure. The generic name *Gymnocarpium* was proposed by Newman[2] for a series of Beech-ferns, Oak-ferns, and others; he overlooked the existence of a prior *Gymnocarpum* (DeCandolle, 1828). Whether the difference of one letter in the ending is sufficient to prevent these two names from being classed as homonyms is open to discussion; but there is more to the matter than that.

In 1909 Copeland[3] proposed the genus *Currania* for an Asiatic fern, which although he did not associate it

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[1] Bartonia **21**: 15. 1941.

[2] Phytologist **4**: 371. 1851. Broun in his Index cites a subsequent appendix page, but the above paging has been checked.

[3] Phil. Journ. Sci. Bot. **4**: 112. 1909.

with the Oak-fern group, was shown by Ching[4] to belong to that group. Then, by a line of reasoning which I (as not a specialist in nomenclature) could never understand, he proceeded to restrict Newman's generic name to the group in question. Since no one had limited Newman's name to this genus before it was given a name by Copeland, the principle of priority seemed to me to require the use of the latter. To put it in another way, the synonymy for the Oak-fern genus is: *Currania* Copeland 1909; *Gymnocarpium* Newman ex Ching 1933.—EDGAR T. WHERRY, *University of Pennsylvania.*

A NEMATODE DISEASE OF FERNS.—As a matter of record it should be reported that the leaf-nematode *Aphelenchoides fragariae* is one of the worst pests that we have in fern gardens. I do not remember having seen it mentioned previously in the Fern Journal. This nematode, which is invisible to the naked eye, is the cause of brown wedge-shaped sections between the veins of the pinnae, which are followed by the drying up of the foliage progressively up the stem, causing reddish to black bands across the fronds. Finally the entire frond curls up and dries.

This nematode swims in a film of water from the soil up the stems and from pinna to pinna. The browning and discoloration of plant tissue is bounded by the longer veins, so that it is more or less wedge-shaped. The shape of the dead tissue more than any other symptom separates nematode work from fungus diseases.

In the fern garden, the nematodes seem fairly selective in their hosts. Among the native ferns, the narrow-leaved spleenwort seems to be the most susceptible. The English crested ferns all seem to be vulnerable.

For control, the use of nicotine sulfate or parathion has been recommended, but I have had more success using a systemic insecticide such as sodium selenate.

[4] Contr. Biol. Lab. Sci. Soc. China, Bot. **9**: 30. 1933.

Used in pellet form with the same dosage as recommended for chrysanthemums seems to give reasonably good control. Some of the other systemics such as Pestox or Systox may prove to be even better, but, as far as I know, they have not been tried on ferns.—M. D. MANN, JR.

A NOTE ON EQUISETUM.—The post-glacial physiography of the Champlain Valley has been of especial interest to me for many years. I have given particular study to the area that is included in the town of Crown Point, New York. The latest phase of the disappearance of the continental ice-sheet, prior to the present one, from this region was characterized by an invasion of saline waters by way of the St. Lawrence Valley. Marine shells of several species, abundant farther north, as well as other evidence, attest this fact. Marine shells had been reported from Crown Point by qualified observers, but no specimens were preserved and subsequent search has failed to find more in the same place. However, it was my good fortune to find a place along the Delaware & Hudson Railroad where the soil had been recently disturbed deep enough to dig into the old marine clay. In it I found abundant specimens of *Macoma groenlandica,* many of them being imbedded within the clay. Along with these shells were fragmentary carbonized (?) stems of *Equisetum hyemale.* Not satisfied with my own identification, I took specimens to the botanists of the N. Y. State Museum, where my identification was verified. To my knowledge, this may be the only known instance of finding remains of an *Equisetum* species closely associated with soils resulting from the dwindling ice-sheet. I believe it substantiates the idea that the masses of stagnant ice may have been closely approached by normal vegetation such as we know at the present time.—E. EUGENE BARKER, *9 Ten Broeck Place, Albany, N. Y.*

Recent Fern Literature

"Index Isoëtales"[1] by Dr. Clyde F. Reed is a comprehensive index to the names that have been proposed for the quillworts and their fossil allies. It will not be of use to the general fern student, for it is merely a list of names with places of publication and indications of synonymy. However, like all such technical indices, it will have a useful place on the book-shelf of the specialist. These "fern-allies" are not included in Christensen's Index Filicum; accurate and comprehensive indices are needed for all groups, especially perhaps for *Equisetum* and *Selaginella*. Dr. Reed's Index appears to be accurate and perhaps too comprehensive—it contains a large number of names that ought not to have been listed, invalid names without status. Dr. Reed has mentioned this in the Preface, saying that these invalid names have been included "for convenience"; however, it is really not convenient for the user, who must look up for himself in the original sources to decide if names are valid or not, a decision that it is the duty of the indexer to make. I am not speaking, of course, of illegitimate names (synonyms, homonyms, and so forth); these must naturally be included in any index. But invalid names, those never validly published at all according to the Code, have never had any existence and therefore can not with any logic be included in an index to Isoëtales; they do not belong to the Isoëtales or to any group. (Incidentally, "Index Isoëtales" has a Latin form but does not seem to me to be good Latin; it really ought to be "Index Isoëtalium.") Dr. Reed has followed a conservative course in recognizing species and varieties. There are no changes in the status of the United States species, and no new combinations are made.—C. V. MORTON

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[1] Boletim da Sociedade Broteriana, vol. 28, Ser. 2a, pp. 1–72. August, 1953.

A paper by J. Poelt[1] discusses the genus *Woodsia* in Europe. Three species—*W. ilvensis*, *W. alpina*, and *W. glabella*— have been recognized in *Euwoodsia*, and one—*W. fragilis*—in the subgenus *Physematium* (without articulate stipes). Two areas of distribution have been assigned to *W. glabella*—the Alps and the Scandinavian countries—but Poelt finds that two species are represented. The northern plant is true *W. glabella* and the plant of the Alps is *W. pulchella* Bertoloni. The two are differentiated as follows:

Blades linear-lanceolate to linear, 6–10 (12) mm. wide; pinnae normally close or a little imbricate, the lower 4–7 round or broadly ovate, very obtuse, the upper broadly to narrowly ovate; scales blunt to narrowly acute, the walls little thickened. W. glabella

Blades broadly to narrowly lanceolate, 8–14 (19) mm. wide; pinnae distant, normally not imbricate, only the lowest 1–4 (5) round, the upper narrowly ovate to lanceolate; scales acute to long-hair-pointed, often with strongly thickened walls. W. pulchella

The shape of the blades and pinnae is considered the most distinctive character.—C. V. MORTON

Although it is not customary to review books not dealing with ferns, we might mention a recent book "Philippine Orchids," by R. S. Davis and M. L. Steiner[2] that will be of use to those having heated greenhouses. Many of the Philippine species are prized by orchid fanciers. The present book discusses these in a rather non-technical way, and many species are illustrated by photographs of living specimens.—C. V. MORTON

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[1] Zur Kenntniss der Gattung Woodsia in Europa. Mitt. Bot. Staatss. München 5: 168–174. November, 1952.

[2] William-Frederick Press, New York, pp. 1–270. 1952. $5.00.

Volume 2, no. 3, of "Taxon," is devoted to Linnaeus and is issued in honor of the bicentenary of the publication of "Species Plantarum." It contains several interesting articles: "Species Plantarum, 1753–1953," by J. A. Nannfeld; "Linnaeus as a Nomenclaturist," by T. A. Sprague; "Linné's Significance for the Development of Phytography," by C. E. B. Bremekamp; "Linnaeus and the Species Problem," by H. K. Svenson; "A Trial Proof Page of the Species Plantarum," by S. Savage; "The Preparation of the Species Plantarum," by A. H. Uggla; "Linné und die Species Plantarum," by F. Bryk; and "Bibliographia Linnaeana ad Species Plantarum Pertinens," by F. Bryk. The journal "Taxon" comes free to members of the International Association for Plant Taxonomy. This international organization deserves the support of all of us. Dues are currently only $3.00 a year, payable through Dr. Reed Rollins, Gray Herbarium, Harvard University, Cambridge, Mass.—C. V. Morton.

"The Ferns and Fern-allies of Maryland and Delaware including District of Columbia," by Clyde F. Reed[1] covers an area not treated specifically in any local fern flora, although coming within the range of Gray's Manual and the new Britton and Brown. Approximately 70 species are treated and numerous hybrids, varieties, and forms are mentioned or treated in detail. The whole book is printed by offset; the text has come out well, but the illustrations leave much to be desired—they are lacking in clarity and detail, and some are practically useless, figure 32 (*Botrychium dissectum*), for example. The nomenclature follows Fernald closely (except for the adoption of several segregate families from the Polypodiaceae, following Copeland, and going Copeland one

[1] Pp. 1–286, pl. 1–72, maps 1–58. 1953. Published by the author, 10105 Harford Road, Baltimore, Maryland. $3.00.

better by splitting up the Ophioglossaceae by recognizing "Botrychiaceae" and Schizaeaceae by "Lygodiaceae"), including the questionable adoption of the name *Cheilanthes vestita* for the species usually called *C. lanosa*. One of the errors[2] likely to cause confusion is in the key to *Asplenium*, where *A. Trichomanes*, *A. resiliens*, and *A. platyneuron* will not "key out," because they are under the erroneous heading "Pinnae pinnate with toothed or undulate blades"; a plant with the "pinnae pinnate" would be bipinnate, a condition not present in the three species mentioned. Another serious error is in citing the authority for Clinton's fern as "× *Dryopteris Clintoniana* (D. C. Eaton) Wherry, Amer. Fern Journ. 40:119. 1950," and placing *D. Clintoniana* (D. C. Eaton) Dowell (1906) as a synonym. This procedure is, of course, absolutely contrary to the International Code of Botanical Nomenclature (Article 60). A change in status from a species to a hybrid (or *vice versa*) does not warrant a change in the original authority. (In justice to Dr. Wherry, it should be stated that this error

[2] Dr. Wherry has indicated to me some of the bibliographic errors that he has noted in the book. On page 258, *Adiantum pedatum* var. *originarium* Wherry is misspelled *originarum*. On the same page, the citation for *Asplenium Bradleyi* × *montanum* is given as Wherry, Guide to Eastern Ferns, p. 131, 1942, which is a reference to the second edition; this hybrid was first published in edition 1, p. 109. 1937. On page 265, the combination *Lycopodium flabelliforme* (Fernald) Blanchard is attributed to volume 3 of Rhodora, when it should be volume 13. On page 264, *Equisetum sylvaticum* var. *multiramosum* Wherry is listed erroneously as forma *multiramosum* Wherry. Dr. Wherry also points out that, on page 121, *Dryopteris marginalis* forma *tripinnatifida* is referred to as "Christmas Fern," surely unintentionally, as this species is elsewhere called (on the same page and on the previous page) Marginal Shield Fern. On page 238, the Selaginellaceae is given the strange name "Moss-spike Family," although on the following pages *Selaginella* is called correctly Spikemoss. Dr. Wherry doubts also the authenticity of some of the distribution maps; he states that, although he has covered Maryland and Delaware pretty thoroughly over a period of many years, he has found only three occurrences of *Athyrium Filix-femina* var. *Michauxii* forma *rubellum*, whereas Dr. Reed's map shows about 200 localities distributed generally over the two states.

is solely Dr. Reed's; Dr. Wherry did not attribute the combination "× *D. Clintoniana*" to himself.) The present work will undoubtedly find a valued place on the bookshelf of the student of the ferns of the eastern United States; those interested in cultivating ferns will also find useful information concerning the natural habitats of the various species.—C. V. MORTON.

Dr. Rodolfo Pichi-Sermolli is continuing his technical studies of ferns. Some of the titles that have not been noted so far in the Journal are: "Sulla sistematica e nomenclature di alcune piante dell'Abissinia"[1] [this discusses *Aspidotis*, treated as monotypic by Copeland, which now contains three species: *A. californica* (Hook.) Copel., *A. meifolia* (Eaton) Pichi-Serm. (Mexico), and *A. Schimperi* (Kunze) Pichi-Serm. (Abyssinia)]; "On Desvaux's 'Aspidium oliganthum' and 'Aspidium oligodonton' "[2] [the former is a synonym of *Athyrium umbrosum*, the latter a valid species of *Dryopteris*, i.e. *D. oligodonta* (Desv.) Pichi-Serm.; the new name *D. Aitoniana* Pichi-Serm. is also proposed, based on *Polypodium elongatum* Ait.]; "The identification of 'Polypodium confluens' Colla and the geographical distribution of 'Notholaena tomentosa' Desv."[3] [*P. confluens*, hitherto regarded as dubious, is a synonym of *N. tomentosa*, a species of Chile and Peru]; "Notes on some Australian ferns"[4] [deals with *Hymenophyllum cupressiforme*, *Notholaena canescens*, *Polypodium Beckleri*, *P. pustulatum*, *P. scandens*, *P. diversifolium*, and *P. Billardieri*]; "The nomenclature of some fern-genera"[5] [discusses certain generic names proposed for conservation, i.e. *Anemia*, *Angiopteris*, *Araiostegia*, *Cheilanthes*, *Conio-*

[1] Webbia 7: 325–351. 1950.
[2] *Op. cit.* 8: 147–154. 1951.
[3] *Op. cit.* 8: 177–190. 1951.
[4] *Op. cit.* 8: 201–224. 1951.
[5] *Op. cit.* 9: 387–454. 1953.

gramme, Cryptogramma, Danaea, Drymoglossum, Gleichenia, Hymenolepis, Lastrea, Lygodium, Matteuccia, Pellaea, Phlebodium, Phyllitis, Platycerium, Polystichum, Pyrrosia, Schizaea, Sphenomeris, and *Tectaria*]. —C. V. Morton.

A paper that will be of interest to students of American ferns is "Spore Morphology in British Ferns" by Elizabeth M. Knox.[1]

The spores of some 45 British species are described and most are figured. The work appears to be carefully done, although not quite with all the refinements advanced in recent years by students of pollen morphology. Most of the species discussed occur in North America in some form or other, a fact apparently ignored by Miss Knox, for she makes no citation of American literature. It is particularly interesting to compare her paper with Dr. McVaugh's "Studies on the Spores of Some Northeastern Ferns."[2] McVaugh describes and illustrates the American marsh fern as having an irregularly ridged and wrinkled perispore; Miss Knox shows the British marsh fern as spinose, much like typical *Cystopteris fragilis.* McVaugh describes and illustrates a perispore in *Athyrium asplenioides;* Miss Knox states that *Athyrium Filix-femina,* which is always admitted to be very closely allied if not conspecific with *A. asplenioides,* is distinguished by the complete absence of a perispore. There are wide divergences in the spore measurements of the two workers, e. g. *Cystopteris fragilis*—McVaugh, spores 30–40 μ long, Knox, 40–53 μ long. One criticism of both papers is that neither indicates the material from which the measurements and illustrations were made. It is obvious that further studies are needed.—C. V. MORTON

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[1] Trans. Bot. Soc. Edinburgh **35**: 437–449. *fig. 1–36.* 1951.
[2] Amer. Fern Journ. **25**: 73–85. *fig. 1–41.* 1935.

American Fern Society

REPORT OF THE MEETING AT OLD MAN'S CAVE, OHIO.—The Ohio members of the American Fern Society met early on the morning of July 29, 1953, at Old Man's Cave, one of the State Parks in Hocking County. With the assistance of Floyd Bartley of Circleville, we were able to show the party some interesting plants, especially the ferns. We entered the Gulf (Old Man's Cave) at the shelter house. Our first ferns were *Athyrium thelypteroides* and *Athyrium asplenioides*, common ferns of the gorge. On the cliffs we found two varieties of *Cystopteris fragilis—Mackayi* and *protrusa*. Next we visited the colony of *Lycopodium clavatum*. This is one of the few colonies of this clubmoss in southern Ohio; it was found by Robert Griggs over forty years ago and is still thriving.

Then we went down the gorge below the falls to see the fine colonies of *Dryopteris noveboracensis* and *Lycopodium lucidulum*. On the cliffs small patches of *Lycopodium porophilum* were observed. In the shaded swales we found *Osmunda cinnamomea* with fronds as long as four feet. We retraced our steps to the picnic grounds after examining a colony of *Lycopodium flabelliforme*. En route we found a nice colony of *Asplenium pinnatifidum* on the dry cliffs.

After a fine noon meal served by Mrs. O. C. Culp, we returned to our cars and drove to Big Pine Valley where we added *Trichomanes Boschianum* to our list. This colony of the filmy fern was not thriving too well. Through the courtesy of the Paxtons we were permitted to visit the finest colony of *Asplenium montanum* in the Hocking Parks area. Here too is one of the few stations for *Asplenium Trudellii*. Our list for the day contained twenty three species of ferns and lycopodiums.

Members in attendance at this foray were: Herbert H. Holliger and family, Huron, Ohio; David L. Emory, Oberlin, Ohio; Dr. and Mrs. Harold Burtt, Columbus, Ohio; William Gidson. Columbus, Ohio; Miss Eichorn, Columbus, Ohio; Alma Raedege, Columbus, Ohio; Florence Branum, Lancaster, Ohio; Floyd Bartley, Circleville, Ohio; and Charles R. Goslin, Lancaster, Ohio.

CHARLES R. GOSLIN
726 E. King St., Lancaster, Ohio

REPORTS OF FIELD TRIPS FOR 1954.—Will leaders of the various field trips and other meetings on the schedule for 1954 be good enough to have someone on the trip serve as historian, to record the chief features of interest on each trip: viz., number of species, with emphasis especially on rarities, new localities for other species, names of those in attendance, and matters of social interest. It is not likely that such reports can be published in the detail which has been given in past years. There are now so many trips that the Journal cannot give space to all of them, but the records are of real interest, and note of at least the high spots will be taken for publication. Photographs of groups and of special species will make interesting additions to all trip reports. It may be possible to use some photographs of this sort, especially if supplementary gifts are received for such specific purposes, as has been the case.

CHANGE OF FIELD TRIP DATE.—The Tennessee field meeting set for June 18–20 has had to be postponed. Dr. Sharp now suggests the fourth weekend in August (27–29), and indicates that a stop in Tennessee may be convenient for some of those members who are planning to attend the Florida meetings. Additional information may be obtained from Dr. Aaron J. Sharp, University of Tennessee, Knoxville, Tenn.

We are sorry to note the death of Mr. Edward P. St. John on July 2, 1953. Mr. St. John was especially interested in the exploration of Florida and was the first discoverer of many ferns in that state. His most notable work was his treatment of the genus *Ophioglossum* in Small's Ferns of the Southeastern States.

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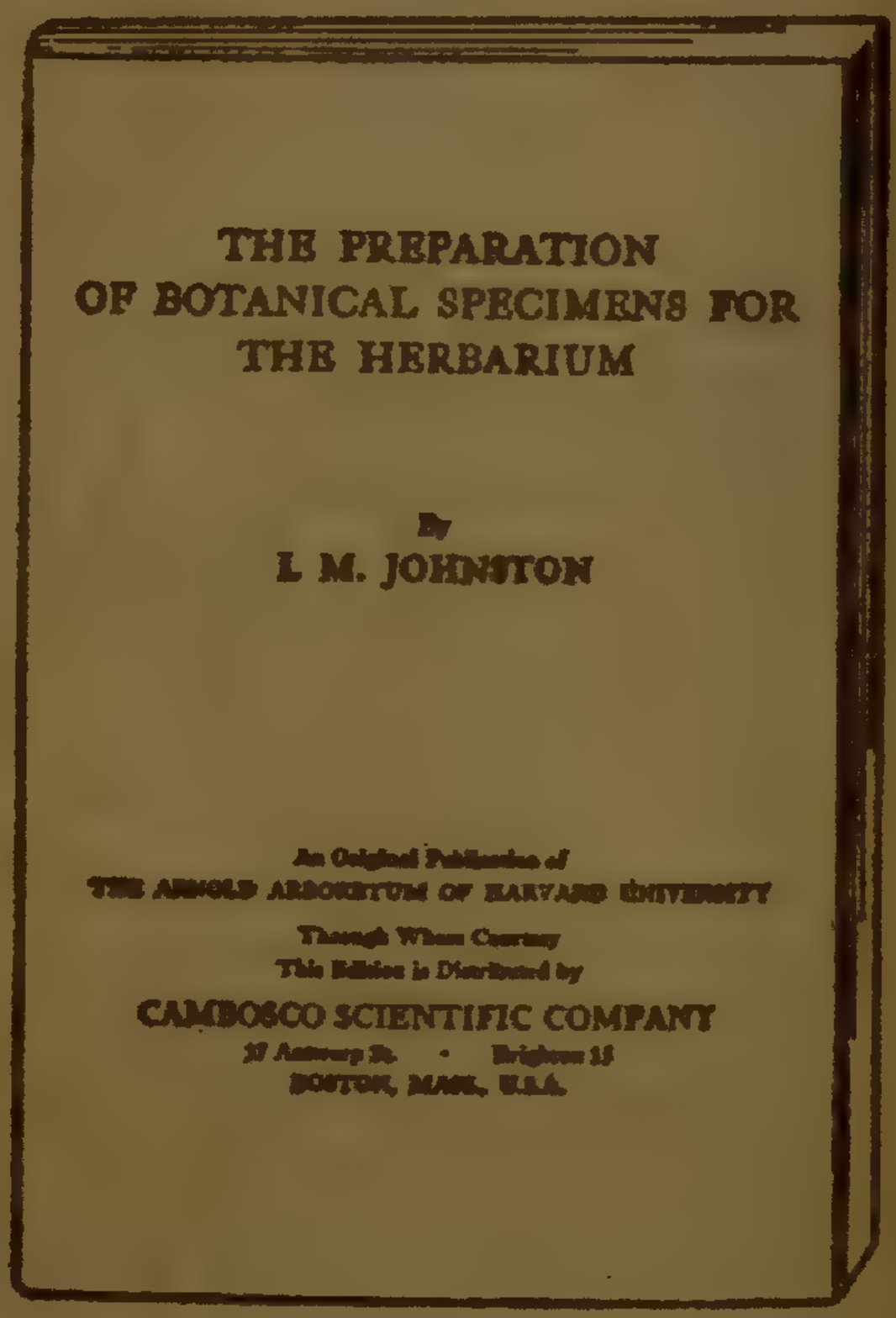

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R. C. BENEDICT IRA L. WIGGINS
A. C. SMITH

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American Fern Journal

VOL. 44 JULY–SEPTEMBER, 1954 NO. 3

Cystopteris dickieana and Woodsia glabella in Arctic Alaska*

IRA L. WIGGINS

On July 9, 1951, Dr. W. C. Steere collected a small, delicate fern near the foot of a rocky outcrop at East Oumalik, on the north slopes of the Brooks Range, Alaska (Lat. 69° 48′ N., Long. 155° 23′ W.). He obtained only three small plants, the largest frond in the collection being only 7 cm. tall. The fern appeared to be a *Woodsia*, and careful scrutiny revealed that it was nearest *W. glabella* R. Br. Hultén[1] cited this species from five stations in his "Central Yukon River District," and eight collections from the "Bering Straits District" of Alaska. Anderson[2] merely stated that *W. glabella* occurs ". . . in most parts of our territory. Circumboreal." Consequently, it seemed advisable to study carefully a fern that had not previously been reported north of the Brooks Range within Alaska, but the meagerness of the material prevented such an undertaking at that time.

A year later the writer collected the same species on a rocky bluff above the Colville River, near the Arctic

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* Contribution No. 1953-10 from the Arctic Research Laboratory, presented in partial fulfillment of Contract Nonr-248(04) with the Office of Naval Research.

[1] Hultén, Eric. Flora of Alaska and Yukon. Lunds Univ. Arssk. N. F. Ard. 2. Bd. 37: 13–18. 1941.

[2] Anderson, J. P. Iowa State Col. Journ. Sci. 18: 148. 1943.

[Volume 44, No. 2, of the JOURNAL, pp. 49–96, was issued June 8, 1954.]

Contractors' camp at Umiat. At the Umiat station the *Woodsia* plants grew in close association with numerous, vigorous clumps of *Cystopteris dickieana* Sims[3] but was much less abundant than the latter species. In fact, as I was collecting hastily during a brief stop of the plane between Fairbanks and Point Barrow, the presence of the *Woodsia* plants was not detected until the material was being placed in the press several hours later.

Two gross characteristics make the *Woodsia* plants easy to segregate from the *Cystopteris* specimens without the use of a lens. The stipes of the *Woodsia* plants are dull yellowish green instead of the glossy brown to nearly black of the *Cystopteris* stipes; and the sori on the fronds of *Woodsia* are more conspicuous, larger in diameter, and more closely crowded than those of *Cystopteris* (*Figs. 2* and *6*.)

When the material is examined under a dissecting microscope a few scattered hairs are visible along the veins and more widely dispersed ones are present on the lower surfaces of the laminae of the pinnae of the *Woodsia* fronds (*Fig. 2*). This contrasts with the available descriptions of the species, for they characterize *W. glabella* as "glabrous." However, the small number of hairs on the blades does not seem to warrant treating the material as anything other than *glabella*.

The indusia of the *Cystopteris* material are not hood-like, but are made up merely of narrow, lanceolate scales attached at the bases of the sori and usually partially or wholly obscured by the rounded tufts of sporangia

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[3] I thought at first the *Cystopteris* was *C. fragilis* (L.) Bernh., and called it by that name in my manuscript. Mr. Morton, noting the rugose to cristate sculpturing of the spore shown on *Pl. IV, fig. 25*, recalled to my attention the paper by Mr. Alston (This JOURNAL **41**: 76–78. 1951). *Cystopteris fragilis* typically has echinate spores, so it seems desirable to consider the Umiat specimens as *C. dickieana*, even though apparently there is no character other than its rugose-cristate spores that will consistently separate it from *C. fragilis*.

(*Figs. 19* and *23*). As is usually the case in *C. dickieana*, the indusium is ephemeral and is rarely found in place beneath sori old enough for the sporangia and their contents to have turned brown (*Fig. 6*). In contrast, the hair-like segments constituting the indusia of *Woodsia glabella* are numerous, persistent, and conspicuously present around and among the sporangia (*Figs. 2* and *16*). No glands are apparent on the pinnae of either species.

When the hairs on the pinnae of the *Woodsia* were observed, momentarily the thought was entertained that the material represented *W. alpina*, but that species seems to be ruled out by the yellowish green stipes and the slight lobing of the pinnae in our material. Examination of the spores of the *Woodsia* from Umiat shows that they are reticulate, with narrow, thin laminae of uneven height around the reticulations (*Figs. 17* and *18*). These spore characters contrast sharply with the "rugose to tuberculate" spores of *W. alpina*. Hultén indicated that he had found the arctic Woodsias are variable when he wrote, "Forms occur that are hard to place within the respective species." Although Hultén did not use spore characters in his key to separate *W. glabella* from *W. alpina* it seems that this feature might be given careful study when a larger number of collections has been obtained. Apparently Hultén considered the shorter, light-colored stipe of *W. glabella* a sufficiently reliable character to permit one to separate that species from *W. alpina*. In view of the known variability that exists within populations of the several species of *Woodsia*, I prefer to consider the collections from arctic Alaska as representing a race not worthy of nomenclatorial separation from *W. glabella*, in spite of the scattered hairs on the pinnae, at least until more material can be studied.

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Since the two species, *Woodsia glabella* and *Cystopteris dickieana*, as represented in arctic Alaska, are so similar in general appearance, and since they seem to occupy the same type of habitat, often growing in intertangled clumps, it may be well to point out some of the added characters that may be used to separate them. The fertile fronds of *W. glabella* tend to be somewhat more slender in outline than those of *C. dickieana* and are nearly always broader somewhat above the middle than they are at the base. The fronds of *C. dickieana*, on the other hand, are consistently broader at the base than at the middle or above. (Compare *Figs. 1* and *5*.) There is less difference in the outlines of the very young, sterile fronds, but those of *C. dickieana* generally are more deeply lobed in the basal pinnae than are those of *W. glabella*.

The scales at the bases of the stipes of *W. glabella* (*Figs. 7–13*) average broader than those of *C. dickieana* (*Figs. 26–28* and *30–32*), although there is occasionally a narrow scale on a *Woodsia* stipe that approaches the broadest ones of *C. dickieana* (*Fig. 4*). The cellular patterns of the scales on the stipes of the two species are similar (*Figs. 14–15*, *22*, and *29*), but although there are no glands in evidence on the scales of *Woodsia glabella* an apical gland is sometimes present on a scale of *Cystopteris* (*Fig. 32*) or on a lateral hair, or at the base of the scale (*Figs. 29–30* and *32*). The arrangement of the cells at the bases of the scales in *Woodsia* follows two types of orientation, as shown in *Figs. 14* and *22*. The larger scales often have the basal margin rimmed by a long cell on each side of the point of at-

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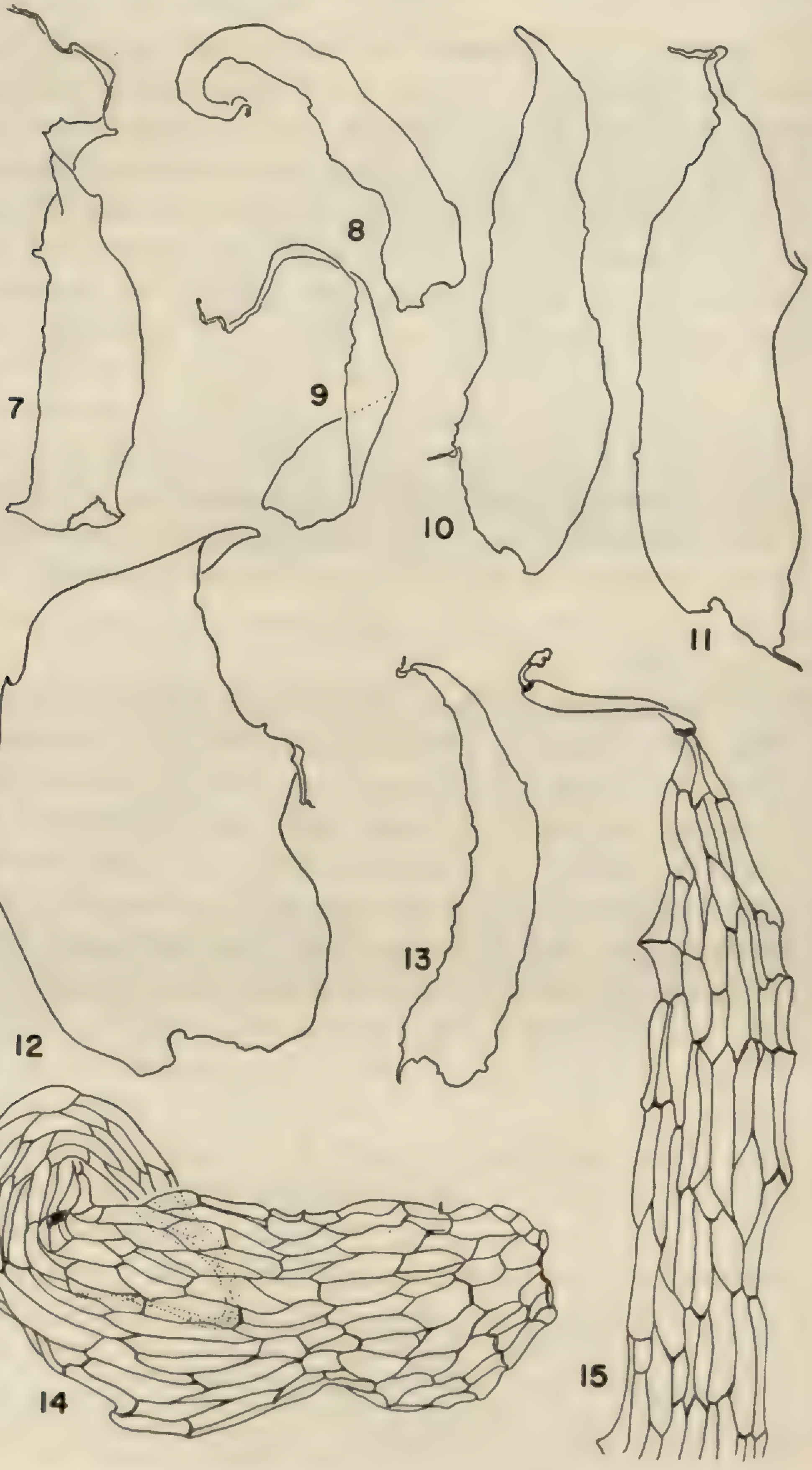
Legend for Plate 8. Figs. 1, 2, 4, *Woodsia glabella* R. Br.; Figs. 3, 5, 6, *Cystopteris dickieana* Sims. Fig. 1, Mature frond, ×0.9. Fig. 2, Ventral surface of single pinnule showing crowded sori and scattered hairs, ×15. Fig. 3, Sterile frond, ×0.75. Fig. 4, Scale from base of stipe, ×30. Fig. 5, Fertile frond, ×0.75. Fig. 6, Ventral surface of single pinnule showing small, scattered sori, ×15.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tachment (of the scale to the stipe) and running outward almost at right angles to the central axis and from which the cells oriented parallel to the axis of the scale depart. This arrangement has not been observed in any of the *Cystopteris* material.

The arrangement of the cells at the base of the scales in *Cystopteris* (*Fig. 29*) is similar to that found in the smaller scales of *Woodsia glabella* (*Fig. 14*), with the differences noted above that glandular cells are often present at the tips of the auricular processes of the scales in *C. dickieana.*

In my material the number of sporangia in an individual sorus is consistently lower in *C. dickieana* than in a sorus of *W. glabella* (*Figs. 19, 23–24,* and *16,* respectively). Three to 12 sporangia represent the normal variation in sori of *C. dickieana,* while 25 to 50 is the common range in *W. glabella.*

The spores of *W. glabella* are slightly larger, more distinctly reticulate, and with larger areolae of smooth exine than those of *C. dickieana* (*Figs. 17–18*). The ridges around the reticulations of *C. dickieana* spores are lower, broken into more numerous processes that sometimes approach spines, and often have small wrinkles and minute bosses on the floors of the areolae (*Fig. 25*).

Figure 16 shows the approximate abundance of the hairs that constitute the indusium of *W. glabella,* while *Figures 19* and *20* show that, although the indusium in *C. dickieana* is scarcely a hood, it is made up of a scale several cells wide. The tips of these indusial scales in *C. dickieana* are usually attenuate into an apiculation made up of one to several cells, and the apiculations

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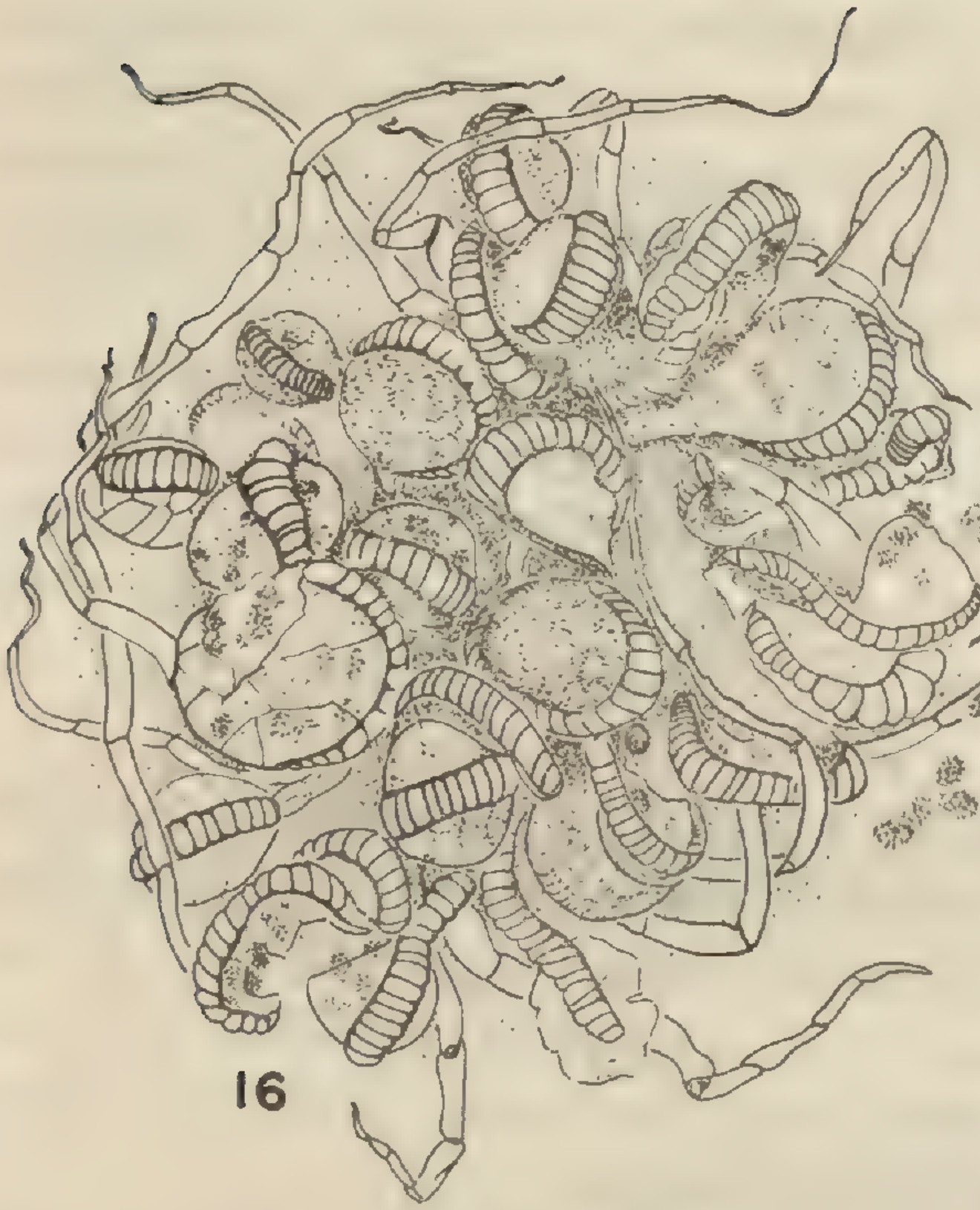
Legend for Plate 9. *Woodsia glabella* R. Br.; Figs. 7–13, Outlines of representative scales from the stipe, × 30. Figs. 14–15, Cellular details of scales from base of stipe, × 75.



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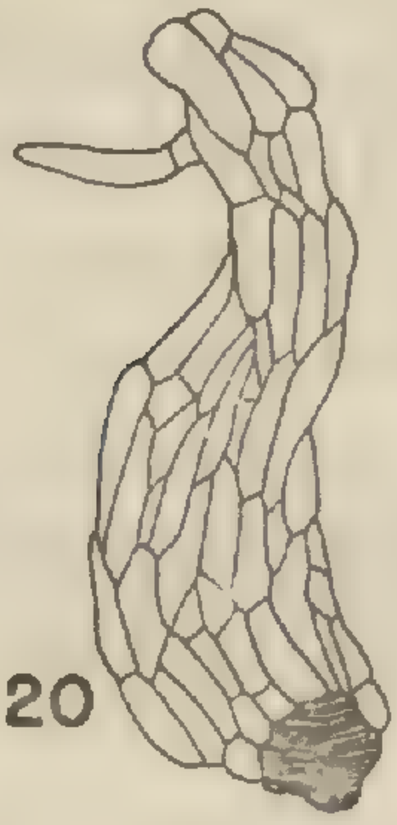

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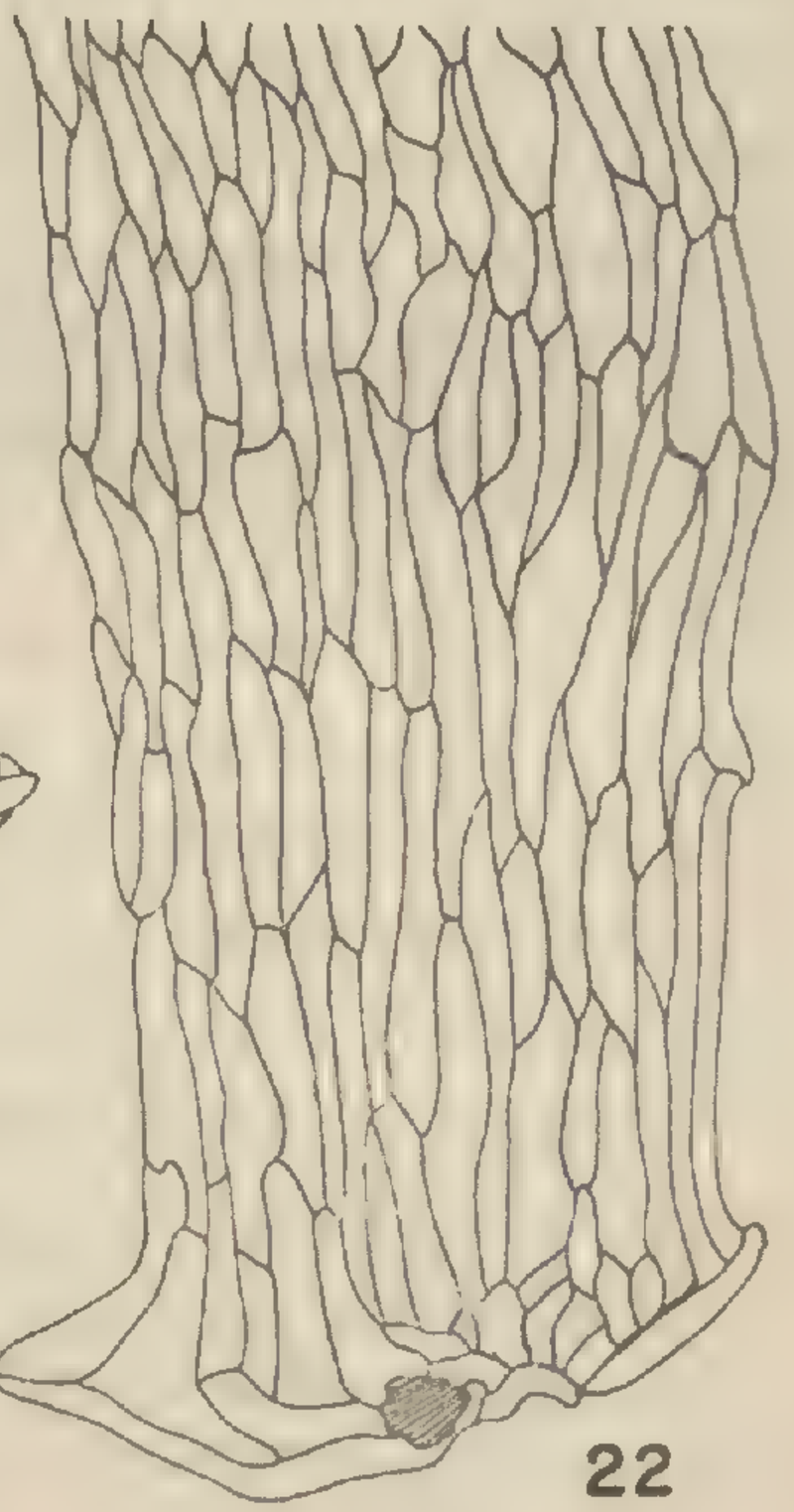

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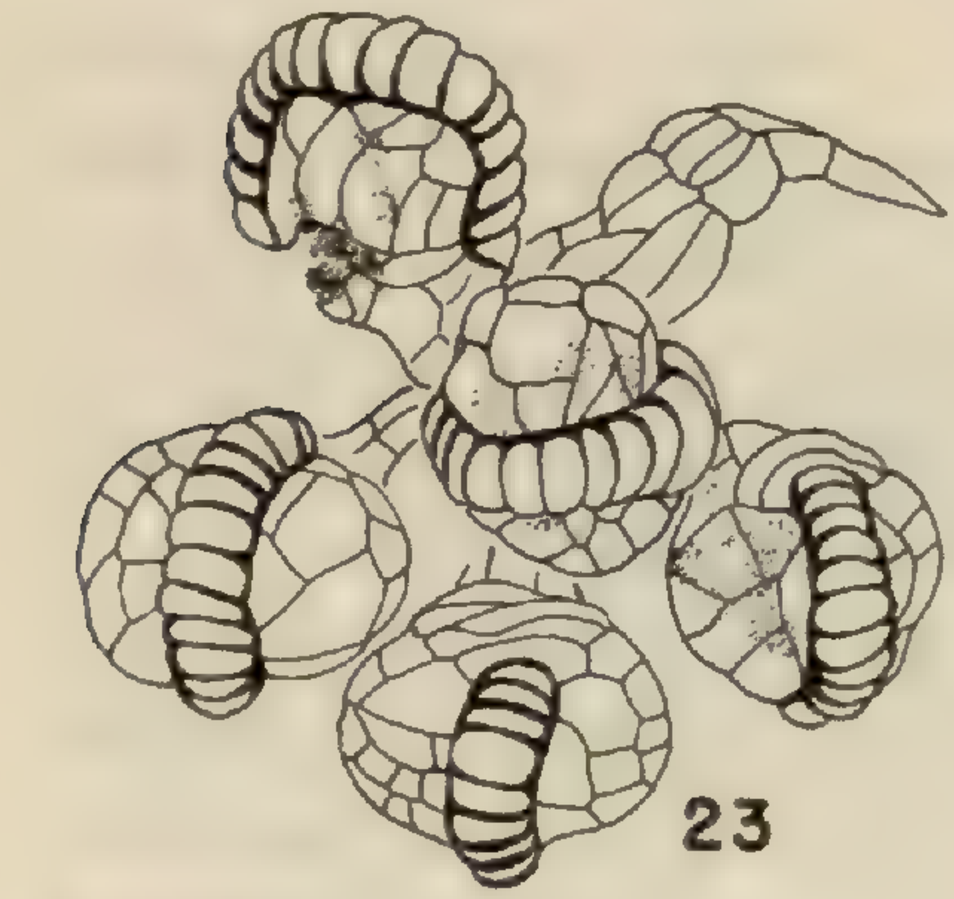
sometimes approach a filament. These slender tips are frequently turned back toward the base of the scale, and in some indusia a second process occurs (*Fig. 21*). Possibly these scales result from the splitting of a broader, hood-like indusium, but if so, this situation is not apparent in any of the material studied.

In April, 1953, I checked the material in the fern collections of the U. S. National Herbarium, hoping to find additional localities represented among the specimens deposited there. Not a single new collection of *Cystopteris dickieana* from arctic Alaska was found there nor at the herbarium of the University of California nor the California Academy of Sciences. Only three collections of *Woodsia glabella* from northern Alaska had been added to the National Herbarium material since Hultén examined the specimens in that herbarium during the preparation of his book. Only the following new localities represent those known to yield *C. dickieana* or *W. glabella* from the Alaskan Arctic or Subarctic, as represented by material in the three herbaria mentioned and in the Dudley Herbarium at Stanford University.

Cystopteris dickieana Sims: Umiat, Alaska, on northeast bluff at base of small rocky outcrop, alt. about 475 feet, August 7, 1952, *Wiggins* 12,936 (Lat. 69° 24′ N., Long. 152° 10′ W.). (Deposited in the Dudley Herbarium, Stanford University.) It is practically certain that this fern occurs at numerous localities along the northern flanks of the Brooks Range, but no specimens have been seen by me from such stations. Mr. Lloyd Spetzman reported that he had collected *Cystopteris*

Legend for Plate 10. Figs. 16–18, 22, *Woodsia glabella* R. Br.: Figs. 19–21, *Cystopteris dickieana* Sims. Fig. 16, Representative sorus, ×30. Figs. 17–18, Typical spores from Umiat collection, ×360. Figs. 19–21, Indusial scales from Umiat collection, ×60. Fig. 22, Cellular details of large scale from base of stipe, ×75.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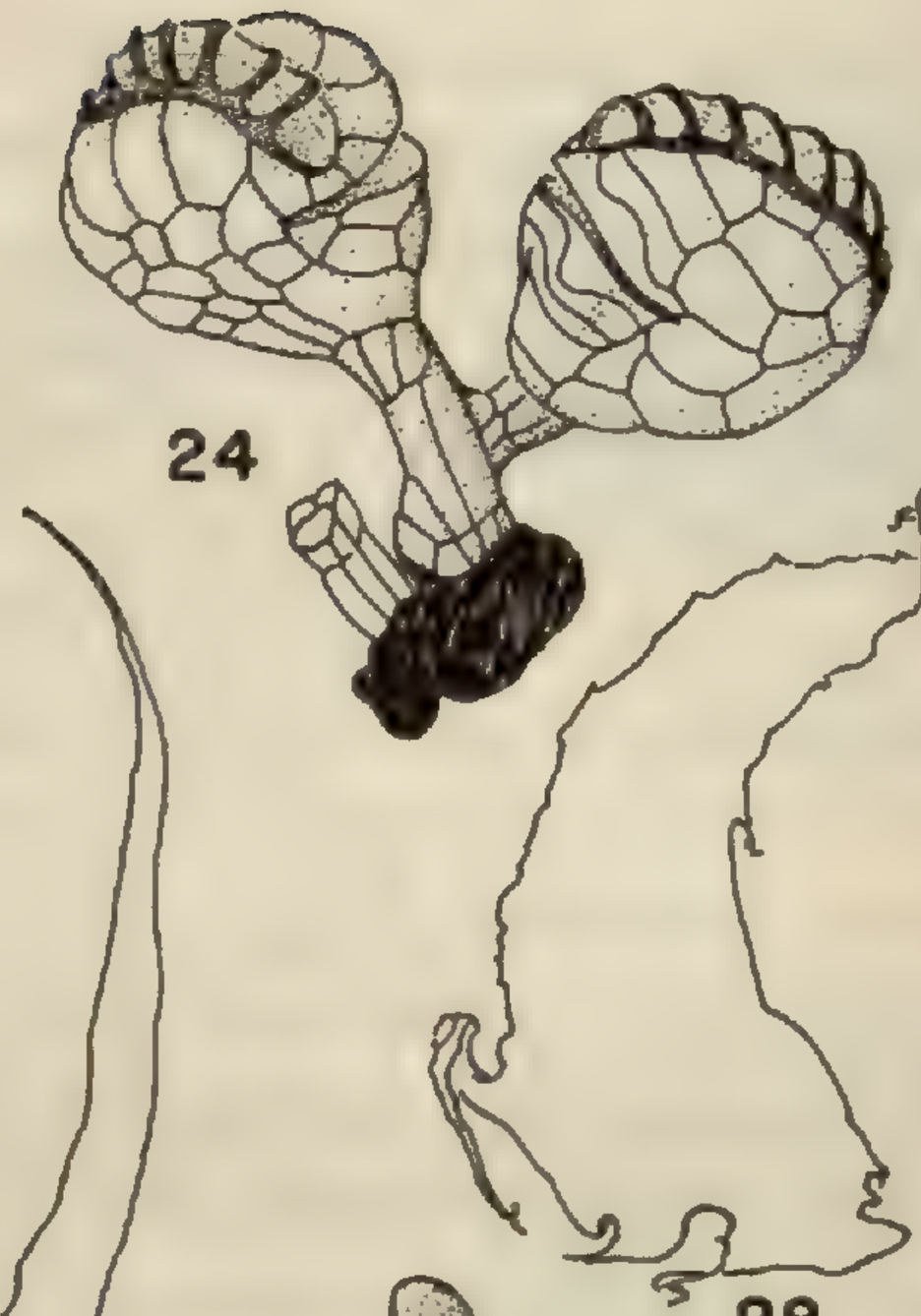
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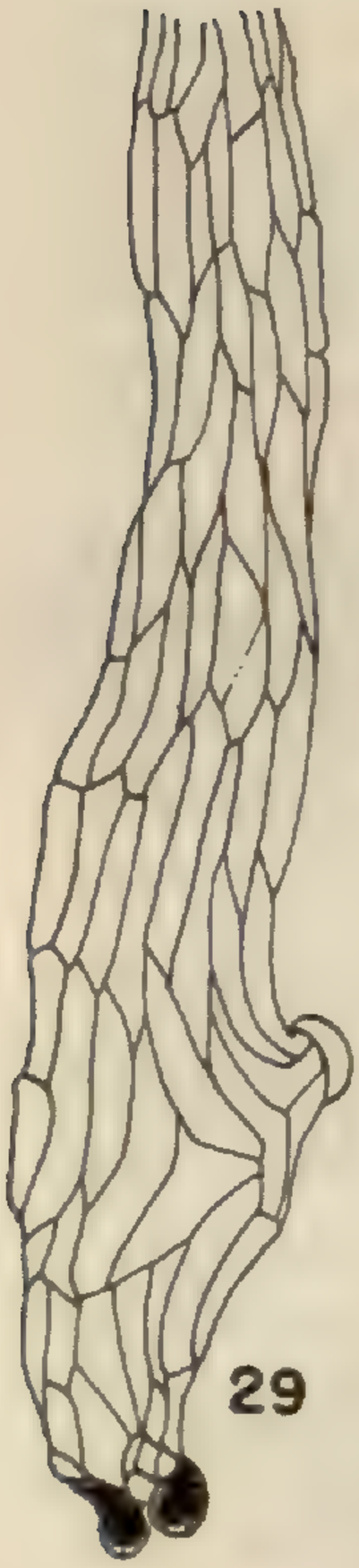
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fragilis, possibly this fern, but his mimeographed list of plants collected did not give definite localities.

Woodsia glabella R. Br.: Umiat, Alaska (growing with material of *C. Dickieana* listed above), August 7, 1952, *Wiggins* 12,936A (Dudley Herbarium); East Oumalik, Lat. 69° 28′ N., Long. 155° 23′ W., July 9, 1951, *W. C. Steere* 15,596 (Dudley Herbarium); about 20 miles east of Dawson, on road to McQueston, Yukon Territory, Canada, *J. A. Calder & L. G. Billard* 3766, July 17, 1949 (U. S. National Herbarium); Anaktuvuk Pass, among rocks in limestone area at 900 m., Lat. 68° 20′ N., July 1, 1949, *George A. Llano* 3164 (U. S. National Herbarium).

During the past few months W. J. Cody has reported *Cystopteris fragilis* from Southampton Island[4] and at Ross Bay on the Melville Peninsula[5]; and *Woodsia glabella* on Southampton Island at two hitherto unreported localities, and near Spence Bay on the Boothia Isthmus.[6]

The late Louis Jordal did intensive field work in the vicinity of Wiseman, Alaska, located on the southern flank of the Brooks Range, but well within the area that is still poorly known botanically in the northern part of the territory. I believe that he reported both *Cystopteris fragilis* and *Woodsia glabella* in that general region, but his typewritten report to the Arctic Institute of North America, in which he recorded his observations

[4] The Canadian Field Naturalist **65**: 63–66. 1951.
[5] Op cit. 191–194. 1951.
[6] Op cit. **67**: 40–44. 1953.

Legend for Plate 11. Figs. 23–32, *Cystopteris dickieana* Sims. Figs. 23–24, Sporangia, with small indusial scale subtending sporangia in Fig. 23, × 60. Fig. 25, Spore from Umiat collection, × 360. Figs. 26–28, 30–32, Representative scales from lower part of stipe, × 30. Fig. 29, Cellular details of lower one-half of scale from stipe, × 75. Fig. 33, Hairs from lower surface of pinnule of *Woodsia glabella* R. Br., × 60.

and the species collected, has not been available for verification of this belief.

Lloyd Spetzman collected plants along the northern flanks of the Brooks Range from the vicinity of the Sadlerochit River and Schrader Lake in the eastern Alaskan Arctic (Long. 144° 20′ W.) to Noluk Lake and the headwaters of the Colville River (Long. 160° W.). He has, without doubt, found one or both of the ferns here under consideration at several localities between these eastern and western areas. The mimeographed list which covers his collecting from the summer of 1946 through that of 1949 does not give definite localities, but merely the main rivers and lakes along which he worked, and does not refer the species listed to any one of the localities.

I have had no opportunity to examine the specimens of *Cystopteris* reported on by Cody nor those collected by Spetzman or Jordal. There is no assurance, therefore, that *C. dickieana* is the species from the Canadian Arctic reported by Mr. Cody or that this species entirely replaces *C. fragilis* throughout the northern part of North America.

DUDLEY HERBARIUM, STANFORD UNIVERSITY.

Longevity of Some Botrychium Species

JULIAN A. STEYERMARK

In the fall of 1941 we moved forty miles northwest of Chicago to an area of wooded ravines situated on the Valparaiso Moraine in Lake County, Illinois. The dissected rolling topography presents varied habitats—from calcareous lakes situated in the depressions between the hills to natural upland ponds, from neutral to calcareous rich woodland valleys and ravine slopes to upland acid oak-hickory knolls and ridges.

Surrounded by this type of natural setting, our five-acre tract offered a botanical paradise, and to us an ideal place to live. On the upper portion of a gentle southwest-facing slope, where the soil was well-drained and dryish, the black raspberry (*Rubus occidentalis*) was quite common and in some places formed dense thickets. Overhead *Quercus macrocarpa*, *Q. ellipsoidalis*, *Fraxinus americana*, *Prunus serotina*, and *Carya ovata*, mingled with an occasional *Juniperus virginiana* f. *crebra*. While digging up some of the much too abundant *Rubus occidentalis*, I suddenly discovered a single plant of typical *Botrychium dissectum*. This was during the autumn of 1941. I was overjoyed with this find, as the typical dissected grape-fern is very rare in Illinois. As late as 1947 it had been recorded by Jones[1] from only three counties (Gallatin, Kankakee, and Peoria). Subsequently it was collected in Boone County by George and Barbara Fell, and this collection together with my Lake County specimen (taken from a newly fallen frond) were recorded in Rhodora.[2]

I have searched in various sections of the large extent of forest known as the Biltmore Estates (five miles north of Barrington) surrounding the area of our home without finding another plant of this *Botrychium*. This lone plant I have, therefore, watched over the years with more than usual interest. It maintains its frond throughout the year. During the spring and summer months it has a dull green color, but after the new frond replaces the old one it presents an attractive bronze russet-purplish color, which lasts throughout the winter months. Each year I have watched this lone plant go through its cycle of growth, the old frond regularly being replaced by a new one.

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[1] Amer. Midl. Nat. 38: 89. 1947.
[2] 51: 147. 1949.

Interestingly enough, two other species of *Botrychium* inhabit this same area of woodland. One, *B. multifidum* (S. G. Gmel.) Rupr. var. *intermedium* (D. C. Eat.) Farw., occurs on a west-facing narrow slope of a ravine. It usually forms its new frond during the month of July. Its fronds, like that of *B. dissectum,* also remains evergreen throughout the remainder of the year and into the following one. Its color, however, is a rich deep green instead of bronze-russet. This plant, also the only one found in the area, I have observed each year since 1941. The third species in this area, *B. virginianum* (L.) Swartz, is quite common. Numerous individuals of this species occur in the rich neutral to calcareous wooded valleys and ravine slopes. As is well known, its fronds are deciduous and die down to the ground during the autumn. I have kept watch over these plants also since 1941.

During part of 1953 I was away on an expedition to South America. Upon my return in August I did not have a chance to check my *Botrychium* plants, as other duties forced themselves upon my attention. In September I had the unusual privilege of showing Dr. Edgar T. Wherry and our editor, Conrad V. Morton, our wild flower sanctuary. Naturally, I wished to take this opportunity of exhibiting to them my choice specimen of *Botrychium dissectum,* which I had been watching since 1941. Imagine my great dismay and consternation to find no trace of the plant. It was well marked off by a triangle of sticks I had placed there all these years. What had happened? The previous autumn of 1952 and the spring of 1953 had been exceptionally dry for this area. Whether the plant had failed to send up its frond because of this unusual drought, or whether it has died of natural old age, I cannot state. At the present time of writing (November, 1953) there is still no trace

of the *Botrychium dissectum*. The other evergreen species, *B. multifidum* var. *intermedium* is, at this writing, in good condition. It has been observed now twelve years, while the *B. dissectum* lasted eleven. It will be interesting to see what develops during the next years.

CHICAGO NATURAL HISTORY MUSEUM AND MISSOURI BOTANICAL GARDEN.

Polypodium vulgare var. virginianum

C. V. MORTON AND CHARLES NEIDORF

The third of the series of illustrations of ferns of the eastern United States shows a photograph by the junior author of the tip of a frond of the common polypody, *Polypodium vulgare* var. *virginianum* (L.) Eaton, from material collected near Yonkers, New York. It shows the round sori without indusia characteristic of *Polypodium*. These are terminal on (borne at the ends of) the distal (i.e. those nearest the apex of the segment) branches of the vein forks.

The chief interest at present in this species is in the researches of Professor P. Martens, of the University of Louvain. The earlier studies were reviewed by Mr. Weatherby.[1] The last two have not so far been noted.[2] The questions raised are interesting, but the solutions offered can hardly be accepted as a whole without further study. Martens has found that in *virginianum* there are a number of stalked, glandular paraphyses mixed among the sporangia.[3] These can be seen with a hand-lens, but

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[1] This JOURNAL **37**: 124. 1947; **38**: 93. 1948.

[2] Les Organes Glanduleux de Polypodium virginianum L. III. Nouvelles Données Géographiques, Systématiques et Histologiques. La Cellule **53**: 187–212. *Pl. 1.* 1950; Les Paraphyses de Polypodium vulgare et la Sous-espèce serratum. Bull. Soc. Roy. Bot. Belg. **82**: 225–262. 1950.

[3] They can be made out (barely) in the illustration, especially between the sporangia in the lowest right-hand sorus.

Polypodium vulgare var. virginianum

really require a higher magnification for proper study. A typical paraphysis of *virginianum* has a slender stalk, a knob-like, dark-colored head, and 2-celled glandular hairs arising from the cells of the head. This type of paraphysis is commonly found (according to Martens always) in material from the eastern United States. Typical *vulgare* of northern Europe lacks paraphyses, as does material of var. *occidentale* of western North America. Using this criterion, Martens refers all material from South Dakota, some specimens from Wyoming and New Mexico, all the material from Athabaska, Yukon, Saskatchewan, Manitoba, and Keewatin to *virgiananum,* and also some material from the far west (Oregon and Washington). Much of this material was referred by Maxon to *P. hesperium* and by Fernald to the synonymous *P. vulgare* var. *columbianum.*

These results need to be verified, for it does not seem to us that this western material is typical *virginianum.* Although some paraphyses can be found in western material, these are not always typical of those of *virginianum* and are never abundant. It is doubtful if the occasional presence of a paraphysis is sufficient to outweigh other considerations. A statistical analysis in the manner of Dr. Edgar Anderson might show that we are dealing here with introgression.

A peculiar, atypical kind of paraphysis is known from material collected in Colorado. It shows the head of the paraphysis to be devoid of the 2-celled, glandular hairs. The same sort of paraphysis has been found in three other collections, all from Colorado. Martens identifies these with similar forms from Siberia, which may be correct, but which, *a priori,* seems dubious.

As pointed out by Martens, the presence of these glandular paraphyses in the type species of *Polypodium* invalidates Copeland's key (and perhaps concept?) in

his Genera Filicum (p. 177), where *Polypodium* is keyed out under the heading "Glandular paraphyses wanting."

Martens recognizes *P. virginianum* as a species, as does Miss Manton. We prefer to maintain *virginianum* as only a variety (or subspecies) for the present, recognizing that it may be necessary later to accord it specific rank. However, the status of the various races both in North America and in Asia needs to be investigated further.

A New Form of Cystopteris bulbifera

H. LINCOLN FOSTER

The Bulblet Bladder-fern is a common feature of the stream-sides and moist woods in the Housatonic Valley region of northwestern Connecticut. On limestone ledges it frequently makes a solid curtain of long, graceful, narrow fronds, sometimes sweeping its decumbent tips into the tumbling waters of a brook. Always the plant has so uniform a character that it is easily identified by a quick glance and at a distance. Unlike our other common *Cystopteris*, the Fragile-fern, *bulbifera* appears to give rise to no unusual forms or varieties. There seem to be few records of variation in the literature commonly available.

It was, therefore, with considerable surprise that I was able to give field identification to an odd looking fern by noting the presence of bulblets along the back of the rachis. It was clearly *Cystopteris bulbifera*, but of such an unusual appearance as to call immediate attention to itself amidst a solid hanging mass of typical Bulblet Bladder-fern.

Mr. Boughton Cobb, the author of a forthcoming handbook on the ferns, and Mrs. Foster, his superlative artist illustrator, and I, a sort of assistant collector, were

a.

b.

c.

d.

a - Pinnae and bulblet
b - Pinnae
c - Pinnule, underside
d - Immature Sorus

Cystopteris bulbifera - forma crispa

exploring for *Cryptogramma Stelleri* on the high limestone ledges along the Housatonic River below the old falls in Falls Village, town of Canaan, Connecticut. We had worked our way upstream along the west bank, and Mrs. Foster, a veritable bird-dog for ferns, spotted a flourishing clump of the shy Rock Brake, a very rare fern in our state, in limey mud on a high, almost inaccessible shelf. It was on the return foray down the east bank that I spotted the odd *Cystopteris*. I was working my way precariously along a narrow, dripping ledge when I saw the plant. With some difficulty I found a firm enough footing so I could use both hands, and with a long knife worked the plant out of a fairly deep crevice. That evening I established it in my garden along a small stream. It was a small plant, with fronds not much more than six inches long.

From four bulblets which I took from one frond I have successfully raised three new plants which are now flourishing, two summers later. Volunteers have appeared near the original plant and my garden should soon have a good showing of this handsome fern.

In cultivation the plant becomes dense and erect, reaching a height of a little over a foot. Its stiffness and the general narrowness of the whole frond, with the crisp, much cut, short fan-like leaflets make it a desirable garden plant, apparently as easy to handle in moist limey soil as the typical form.

CYSTOPTERIS BULBIFERA (L.) BERNH. f. **crispa**, f. nov.

Frondes rigidiusculae, quam f. *typica* breviores et magis erectae, usque ad 30 cm. longae; pinnae ovatae, irregulares, saepe truncatae; pinnulae irregulariter sectae, flabelliformes; stipes et rachis inferior rubescentes, glandulosi; sori plures; indusia dense glandulosa; bulbuli numerosi.

Fronds stiff, shorter and more erect than in the typical form, up to 30 cm. long; pinnae ovate, irregular, fre-

quently truncate; pinnules irregularly cut, fan-shaped; stipe and lower rachis reddish, glandular; fronds heavily fruiting; indusia densely glandular; bulblets numerous.

Type in the U. S. National Herbarium, no. 2082460, a specimen from a plant raised in Falls Village, Connecticut, from a bulblet of a plant collected on the east bank of the Housatonic River, below falls near Falls Village, Litchfield County, Connecticut.

FALLS VILLAGE, CONNECTICUT

Shorter Notes

"We passed the fern-clad banks of a mountain stream and saw where the bull [elephant] had been pulling up bracken with his tusks to get at the roots. The roots of the bracken seem to possess a medicinal quality that serves to keep the great beasts healthy." From "Hunter," by J. A. Hunter, Harper & Brothers, 1952.

DRYOPTERIS "CELSA" AS A FERN HYBRID ADVENTIVE.—A year ago, a small colony of plants, identifiable as intermediate between *Dryopteris Clintoniana* and *D. Goldiana*, ergo, "*D. celsa*," was found in a Pilot Knob swamp where *D. Clintoniana* was abundant but in which no *Goldiana* plants could be found then or this year. Furthermore, no *D. Goldiana* is known to occur native within a good many miles. The basis for this unexpected find becomes clear by reference to the report[1] of the attempted naturalization of the Goldie fern, some years ago, a single plant having been set out at the western edge of this swamp, just above the wetter level. Apparently it lived long enough to spread its spores for a time, long enough for one of its prothallia to form a liaison with a prothallium of the Clinton fern. Whether this northern "*celsa*" is identical with the Virginia forms is yet to be determined; its leaves are certainly

[1] This JOURNAL 43: 81. 1953.

intermediate between those of the two parents in outline. It is hoped that side by side culture of the two types, now under way, may resolve this question.

In one respect, it seems to be like the Virginia form; it occurs as a colony of at least twenty single plants, presumably derived from fertile spores. The plants are uniform in appearance, as were the *celsa* plants seen in such abundance on the recent Virginia, Dismal Swamp field meeting of the Society in June, 1953. In this respect it departs from what is usually observed regarding other hybrids in *Dryopteris*, which usually lack complete uniformity for any given cross; they occur as isolated single plants, or in clumps, presumably formed by vegetative branching; their spores are lacking or else few and anomalous. It is to be hoped that cytological studies on these hybrids and their parents may presently lead to a much better understanding of them. Meanwhile, field and taxonomic studies, including spore studies, together with comparative garden culture can contribute much more useful data.—R. C. BENEDICT.

FERNS, WEEDS, AND WEED KILLERS.—"All ferns are resistant [to weed killers]. *Dennstaedtia punctilobula*, *Onoclea sensibilis*, and *Pteridium aquilinum* require constant attention since on recuperation they tend to reproduce rapidly." So wrote Frank E. Egler[1] in connection with a discussion of "Herbicide Effects in Connecticut Vegetation." The comment started a train of thought as to the status of ferns as weeds. What species may at any time be so classed? How extensively have weed killers such as 2,4-D, *et al.*, been tested on them?

Some thirty years ago, after the statement had been made that ferns could scarcely if ever be found in the

[1] Botanical Gazette **112**: 85. 1950.

weed class, it was challenged by a reference to the invasion of cranberry bogs by the common marsh-fern (*Thelypteris palustris*). Since then, the common brake has certainly been convicted, not only of invading pasture land but also of toxic effect as a cattle graze. In fern beds, the common sensitive-fern can be aggressive in relation to other more delicate species.

In my experience, another pteridophyte, the ubiquitous horsetail, *Equisetum arvense*, may at times spread abundantly in a lawn area, especially where its roots can reach down to underground water. In such an area close to the margin of Lake George, where a new soil fill had been seeded to blue-grass, the horsetail came up abundantly, presumably from rhizomes in the new soil. It may be added that a single spraying of a dilute 2, 4-D solution (sodium salt) caused the *Equisetum* to turn black and die, leaving the grass in sole possession of the small area.—R. C. BENEDICT.

Recent Fern Literature

The most important publication on the ferns of Africa to appear in many years is "Les Pteridophytes de L'Afrique Intertropicale Française," by Mme. Tardieu-Blot,[1] of the Muséum National d'Histoire Naturelle, Paris. The area treated is French West Africa, French Equatorial Africa, and the parts of Cameroons under French mandate. This vast area includes those regions known as Middle Congo, Gabon, Oubangui Chari, Tchad, Niger, French Sudan, Mauritania, Senegal, French Guinea, Ivory Coast, and Dahomey. The adjacent areas Port Guinea, Sierra Leone, Liberia, Gold Coast, Nigeria, Fernando Po, and San Thomé, although politically separate, are intimately related geographically and floristically.

[1] Mémoires de l'Institut Français d'Afrique Noire, no. 28, pp. 1–241. *pl. I–XLIV*. 1953. 1250 francs. Dakar, French West Africa.

The present flora will be useful also for the large areas to the south (Belgian Congo and Angola), although not all the species of these areas are treated.

The treatment is almost strictly taxonomic, although there is a brief discussion of general ecology of the ferns of the regions. Mme. Tardieu-Blot is to be congratulated on the general soundness of her treatment. She maintains the Polypodiaceae intact in its traditional sense rather than following some recent authors in segregating it into a number of more or less indefinable families. Regarding these related groups as families or as merely subfamilies is purely a matter of convenience rather than correctness, and convenience in this instance seems better served by maintaining tradition.

Generic definitions are also conservative in general, except in the treatment of *Polypodium*, which is segregated into a number of genera (*Xiphopteris*, *Grammitis*, *Pleopeltis*, *Microgramma*, *Microsorium*, *Phymatodes*, and *Polypodium*), but not, however, following Copeland or Holttum. The treatment is not exactly comprehensible. *Microsorium* and *Phymatodes*, united by Copeland, are maintained as distinct, but the distinguishing characteristics are not clearly indicated in the key or descriptions. The fundamental character used for the segregation of *Polypodium* has been considered the type of spore (bilateral in *Polypodium*, sens. strict., as typified by *P. vulgare*, and globose-tetrahedral as in *Xiphopteris*, *Grammitis*, and "*Ctenopteris*." None of the three species left in *Polypodium* in the present treatment could be so referred by this criterion. The first (*P. oosorum*) would fit into *Xiphopteris* (as defined by Copeland, Amer. Fern Journ. **42**: 41. 1952) and the other two (*P. villosissimum* and *P. Zenkeri*) in "*Ctenopteris*" of Copeland (Gen. Fil. 218). The latter group probably ought to be united with *Grammitis*. In any case, the name *Ctenopteris* is not properly applicable.

The treatment of *Pteris* seems especially good and I approve also of the recognition of *Lonchitis* (merged with *Pteris* by Copeland) as a genus. However, the recognition of *Anisosorus* as distinct from *Lonchitis* is more questionable from a taxonomic and also from a nomenclatural viewpoint (the most acceptable type of *Lonchitis* is *L. hirsutus*, the type also of *Anisosorus*).

Most of the species are unfamiliar to botanists of the United States, but many of the genera would be recognized, such as *Ophioglossum*, *Botrychium*, *Osmunda* (*regalis!*), *Lygodium*, *Trichomanes*, *Pteridium* (*aquilinum!*), *Pteris*, *Acrostichum*, *Cheilanthes*, *Pellaea*, *Adiantum* (*Capillus-veneris*), *Thelypteris* (*palustris!*), *Dryopteris*, *Polystichum*, *Asplenium* (the largest genus, 40 species), and *Athyrium*. Some of the others would look very exotic, such as *Marattia*, *Davallia*, or *Platycerium*. The illustrations are fine and will be helpful. —C. V. Morton.

A list of the pteridophytes of Ethiopia has been published.[1] The genera represented, with the number of species in parentheses, are *Equisetum* (1), *Lycopodium* (3), *Selaginella* (9, incl. *S. rupestris*), *Isoëtes* (1), *Ophioglossum* (3), *Osmunda* (1, *regalis*), *Anemia* (1), *Hypolepis* (1), *Pteridium* (1, *aquilinum*), *Pteris* (5, incl. *cretica* and *vittata*), *Cheilanthes* (4), *Aleuritopteris* (1), *Aspidotis* (1), *Pellaea* (7), *Doryopteris* (1), *Actiniopteris* (1), *Onychium* (1), *Anogramma* (1), *Adiantum* (8, incl. *Capillus-veneris*), *Negripteris* (1), *Nephrolepis* (1), *Arthropteris* (1), *Cyathea* (1), *Polystichum* (1), *Dryopteris* (7), *Tectaria* (1), *Cystopteris* (1, *fragilis*), *Athyrium* (1), *Woodwardia* (1), *Asplenium* (17, incl. *Adiantum-nigrum*, *monanthes*, *pumilum*, *Tricho-*

[1] Enumeratio Plantarum Aethiopiae, III. Pteridophyta, by Georg Cufodontis, Phyton 4: 176–193. 1952 (Ferdinand Borger, Horn, Austria).

manes, and [*Ceterach*] *Dalhousiae*), *Loxoscaphe* (2), *Ceterach* (2), *Polypodium* (3), *Pleopeltis* (2), *Pyrrosia* (1), *Drynaria* (1), *Loxogramme* (1), and *Marsilea* (3). The most interesting is undoubtedly the rare genus *Negripteris*— C. V. Morton.

The European fern that has often been called *Dryopteris Filix-mas* var. *paleacea* is now considered by Manton and others as a distinct species, under the name *D. Borreri* Newm. A recent paper[1] discusses its characters. It is distinguished from the male-fern by having a large number of reddish-brown scales along the rhachis (these fewer and yellow-brown in *Filix-mas*), segments less-toothed and somewhat truncate, semi-evergreen fronds, and apogamous reproduction. The margins of the indusia (when developing in spring) are curled under, whereas in *Filix-mas* the edges are perfectly flat on the surface of the frond.[2] Fresh specimens of *D. Borreri* show a small black area at the junction of the costa of the pinna and the main rhachis; this spot disappears in dried material within a month of collection. It would be of interest to know if some of our species show color changes on drying.—C. V. Morton.

The first of a series of studies of Hydropteridales is concerned with *Marsilea*.[3] Previous work on the organography, anatomy, and morphogenesis is detailed and the results of original work on the branching of the rhizome, the origin and development of the leaves, sporocarp, and sporangia are given.—C. V. Morton.

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[1] The Distribution of *Dryopteris Borreri* Newm. in the British Isles, by P. J. Pugh. Watsonia **3**: 57–65. 1953.

[2] This character has not been mentioned in connection with our United States species of *Dryopteris*. As I recall them, the ones I have noticed have the indusia entirely flat in early stages.

[3] Le Sporophyte de Marsilea, by Roland Tournay. La Cellule **54**: 165–218. *pl. 1, 2.* 1951.

"NORTH WITH THE SPRING," by Edwin Way Teale, is a book well worth reading for its many natural history pictures. References to ferns occur on at least 22 pages, and range from Florida fern-grottoes to "towering fern trees and giant club mosses" preserved in Nickajack Cave in Tennessee from the Palaeozoic era. Referring to Vermont, the author writes, "Ferns ran in banks and waves along the ditches. They flooded away as far as we could see across the woodland floor. They fringed the cracks of rock ledges and crowded close to granite boulders that were scattered like sleeping cattle across pasture hillsides. Here was the fernland of the East."

One sentence, "Only twenty miles from New York, a friend of mine discovered a rare fern, virtually unknown elsewhere in the region, growing at the foot of an embankment on the Long Island Railroad," prompted an enquiry to me from Dr. Wherry as to the identity of the fern referred to. So far I have not located it, but I hope to before long.[1] The comment was made in connection with an observation that railroad rights of way may serve as "sanctuaries" for the preservation of native plant species usually destroyed by agriculture.—R. C. BENEDICT.

The third and last part of "The Evolution of the Ophioglossaceae of the Eastern United States"[2] by Edward P. St. John appeared some time ago. The author's thesis is that study of the vascular structure of the basal and central parts of a leaf reveals the primitive structure of remote ancestors, whereas the pattern of the marginal veins is a recent development. *Botrychium dissectum* is considered the most primitive species of Ophioglossaceae [and, consequently one of the most primitive of all ferns].—C. V. Morton.

[1] It was *Botrychium matricariifolium*.—R.C.B.

[2] Quarterly Journal of the Florida Academy of Sciences 15: 1–19. 1952.

We have received a beautifully illustrated and interestingly written (though poorly proof-read) bulletin on the vascular plants of the Rocky Mountain National Park,[1] six pages of which are devoted to pteridophytes, some 23 taxa of 5 families being covered. The Quillwort Family did not get included, although members of it are well developed in lakes lying at the very edge of the Park, on the west. Brittle-fern, Bracken, and Field-horsetail are the most abundant in the area.

Although the data given as to habitats and localities where the individual taxa are to be found are valuable, the treatment is marred by several misunderstandings. Thus Hollyfern (*Polystichum lonchitis*) is mistakenly keyed out as having pinnae attached by their whole width and indusia kidney-shaped. Alpine Ladyfern, treated as *Athyrium americanum*, is said to grow in the mountains of Europe and Asia, which would only be true when the taxon concerned is united with *A. alpestre*. Western Polypody, *Polypodium hesperium*, is assigned once-pinnate fronds, whereas modern usage favors treating this series of Polypodiums as pinnatisect. In the text the pinnae of the Hollyfern are said to have lobes on the lower, instead of the upper, margin. The technical name of the Oakfern is erroneously given as *Dryopteris phegopteris;* it should be, if one insists on retaining this taxon in that genus, *D. disjuncta*. A Scouring-rush identified as *Equisetum laevigatum* is referred to as evergreen, which suggests that some member of the *E. hyemale* complex was represented instead. Finally, in connection with the Selaginellas, it is stated that "tiny orange bodies in the axils of the leaves are the megaspores"; "megaspores" should be expanded to

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[1] Plants of Rocky Mountain National Park, pp. I–X, 1–201. 1953. By Ruth Ashton Nelson. U. S. Department of the Interior, National Park Service. $1.00 from Superintendent of Documents, Washington 25, D.C.

"megasporangia each containing 2 or 4 megaspores."—EDGAR T. WHERRY.

Three papers by P. R. Bell will be of especial interest to students of fern anatomy. They are: Studies in the Genus Elaphoglossum Schott. I. Stelar Structure in Relation to Habit[1]; II. The Root and Bud Traces[2]; and III. Anatomy of the Rhizome and Frond[3].—C.V.M.

A brief paper "Cytology of the Dryopteris spinulosa complex in Eastern North America"[4] gives the chromosome numbers of several *Dryopteris* species and hybrids (*spinulosa, cristata, Goldiana,* and *marginalis*)—C.V.M.

"The Fern Genus Diellia, Its Structure, Affinities and Taxonomy," by Warren H. Wagner, Jr.,[5] is the only recent work on ferns meriting the designation "monograph." It discusses exhaustively a small genus native to the Hawaiian Islands from the viewpoint of its morphology (both gametophyte and sporophyte), its variation, probable evolution, and taxonomy. It is to be heartily recommended for close study by all fern students. Many of the observations will have a wide interest and their importance is not confined to the genus *Diellia.*—C. V. Morton.

Dr. Luiz Gouvea Labouriau[6] has been publishing, in "Phyton," a series of interesting papers entitled "Contribution to the Study of Sporophyll Morphogenesis in Anemia."—C.V.M.

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[1] Annals of Botany, n.s. **14**: 545–555. 1950.
[2] *Op. cit.* **15**: 333–346. 1951.
[3] *Op. cit.* **15**: 347–357. 1951.
[4] By I. Manton and S. Walker, Nature **171**: 1116–1118. 1953.
[5] Univ. Calif. Publ. Bot. **26**: 1–212. *pl. 1–21. 31 fig.* 1952.
[6] Jardim Botanico, Rio de Janeiro, Brazil.

The following publication is to be noted: "The Genus Pyrrosia (Polypodiaceae) in Africa."[1] *Pyrrosia* (formerly known as *Cyclophorus*), related to *Polypodium*, has seven species in Africa.—C.V.M.

American Fern Society

CORRECTION.—In my report of the New Jersey meeting of October, 1953,[2] I attributed to Miss Clara Hires a statement that spores tend to come to rest always on the same side (p. 46). Miss Hires now calls attention to the incorrectness of this, stating that the purpose of the exhibit was to show how spores come to rest at many angles, combined with varying levels of focus, to present the 3-dimensional spore.—R. C. BENEDICT.

NEW ADVERTISER.—The Editors are glad to call attention to a new advertiser, Henry George Fiedler, on page 3 of the cover. The shelves of this dealer at present carry a considerable variety of fern books, from Lowe's illustrated 8-volume sets and Eaton's Ferns of North America to several 1-volume items: Robinson (1878), Parsons (ca. 1900), Clute's Fern Allies (1928), and others. The Fern Journal will welcome an opportunity to increase its income through the receipt of other acceptable advertisements.

NEW EXCHANGE CENTER.—A Fern Society exchange center for receipt and distribution of spores has been set up. Although it was planned too late for the inclusion of a notice in the last Journal before vacations and collecting trips began, Dr. Benedict mentioned it in his spring mimeographed letter, and several members sent in fertile fronds as a result of that.

---

[1] by E. A. C. L. E. Schelpe, Journ. So. Afr. Bot. **18**: 123–134. 1952.

[2] This JOURNAL **44**: 42–46. 1954.

If you have ferns collected this summer, especially those of unusual interest or from far away places, can you spare fertile fronds for this exchange? If so please send them soon and note where they were collected.

A list will soon be compiled of those on hand together with the name of the donor and locale of collection. This will be sent to any member requesting it who may be interested in growing ferns from spores for fun, for study, or for garden or greenhouse use. As far as possible, spores will then be distributed as requested, with donors to the exchange having first call for any which may be rare or in short supply.

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Mrs. Harold E. Burtt, 2163 N. Starr Road, Columbus 12, Ohio, is looking for a copy of "How to Know American Ferns," by Roberts and Lawrence (Macmillan Company, 1935). Any one have a copy for sale?

Mr. Oscar J. Byers, Jr., 2215 Dwight Way, Berkeley 4, California, writes, "If you know of persons wishing them, I can supply spores of the following ferns: *Adiantum pedatum aleuticum*, *Athyrium Filix-femina* [presumably var. *californicum*], *Cheilanthes californica*, *C. siliquosa*, *C. gracillima*, *Cryptogramma acrostichoides*, *Dryopteris arguta*, *Notholaena californica*, *N. Jonesii*, *Pellaea Breweri*, *P. Bridgesii*, *P. andromedifolia*, *Pityrogramma triangularis*, *Polystichum munitum*, *P. californicum*, *Struthiopteris spicant*, and *Woodsia scopulina*. I am still trying to obtain spores (or living plants) of *Cheilanthes Covillei*, *C. intertexta*, *Pellaea mucronata*, *Asplenium vespertinum*, *Cheilanthes viscida*, *C. Cooperae*, *C. Feei*, *C. Clevelandii*, and *Notholaena Newberryi*."

PRISON WALL PELLAEA STATION NO MORE.—In the first number of the Fern Journal for 1952, a large colony of hundreds of plants of *Pellaea atropurpurea* was reported. It now has to be recorded that the site, a 200-year-old limestone prison wall in Carlisle, Pennsylvania, has been destroyed. I went back last fall for the first time in a year and a half and found no trace of the cliff-brakes. The old prison yard is being used for parking space and other purposes, the wall having been completely rebuilt.—R. C. BENEDICT.

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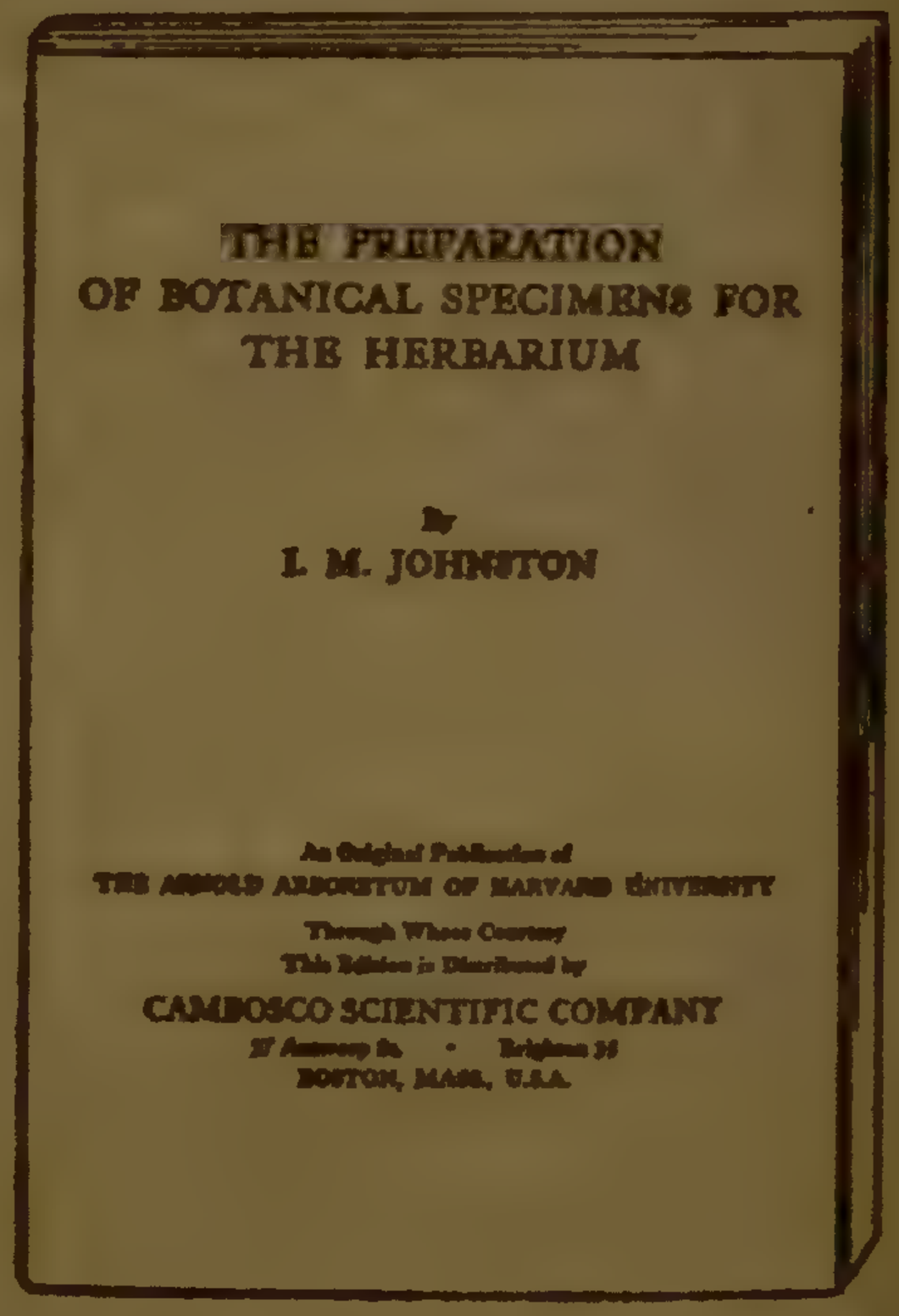

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American Fern Journal

VOL. 44 OCTOBER–DECEMBER, 1954 NO. 4

The Hart's-Tongue Fern in Ontario

JAMES H. SOPER

INTRODUCTION

Descriptions of the Hart's-Tongue Fern (*Phyllitis Scolopendrium* (L.) Newman) and of its habits, habitats and disrupted range in North America have been the subjects of a large number of papers in the various botanical journals. This is evidence of the interest of both amateur and professional botanists in this somewhat unusual fern.

My first encounter with this fern in the field took place in the summer of 1950, when I found it growing in a rocky wooded area close to the edge of the Niagara escarpment near the small community of Kemble in Grey County, Ontario. This station is in one of the areas of greatest abundance of this fern in Ontario, as I realized later while preparing a map of its range.

In the spring of 1951, I discovered what was believed to be a new station for the Hart's-Tongue along the Niagara escarpment south of the Forks of the Credit River in Peel County. This is an extension of some twenty miles from the most southerly station reported at that time. However, during the fall of 1953, another discovery by my friend Professor F. P. Ide and several of his students added a second station still farther south along the escarpment at Mount Nemo in Halton County.

In an effort to determine whether the Hart's-Tongue

[Volume 44, No. 3, of the JOURNAL, pp. 97–128, was issued October 5, 1954.]

had been reported before from Peel or Halton Counties, a detailed search of literature and an examination of available specimens have been undertaken. The results of my findings are presented in the form of a report on the distribution of *Phyllitis* in Ontario, together with a map and a historical account of the discovery of the various stations. It was also found, from field work and literature surveys, that the Holly Fern (*Polystichum Lonchitis* (L.) Roth) is a frequent associate of Hart's-Tongue and its distribution will, therefore, be outlined briefly for comparison.

DISTRIBUTION OF THE HART'S-TONGUE

The only Canadian stations for Hart's-Tongue known at the present time are in Ontario. The now almost legendary station near Woodstock, New Brunswick, has never been reëstablished and some doubt exists as to whether the plants which gave rise to that record were indigenous. The only other Canadian records are two supposed, but unverified, reports, one from Vancouver Island, British Columbia, and the other from Manitoulin Island, Ontario (see Maxon, 14, p. 43).

The available records for the occurrence of Hart's-Tongue (*Phyllitis Scolopendrium* var. *americana* Fernald) in Ontario are shown on a map (Fig. 1) of the southern part of the province. The pattern of distribution obtained is a rather restricted one. One reason for this is the type of habitat in which the fern is usually found and the distribution of this type of habitat. The heavy line which has been added to the base map indicates approximately the position of the Niagara escarpment. There is a very good, though not complete, correlation between the distribution of Hart's-Tongue and the position of the Niagara escarpment in southern Ontario. The origin and extent of this physiographic feature have been set forth clearly by Chapman and Put-

nam (2, pp. 6–7) as follows:

"By far the greatest topographic break produced by differential erosion of harder and softer rock in Ontario is the Niagara escarpment. It rises in New York near Rochester, skirts Lake Ontario to Hamilton, then passes north to Collingwood. The Blue Mountain south of Georgian Bay, the Bruce Peninsula, and Manitoulin

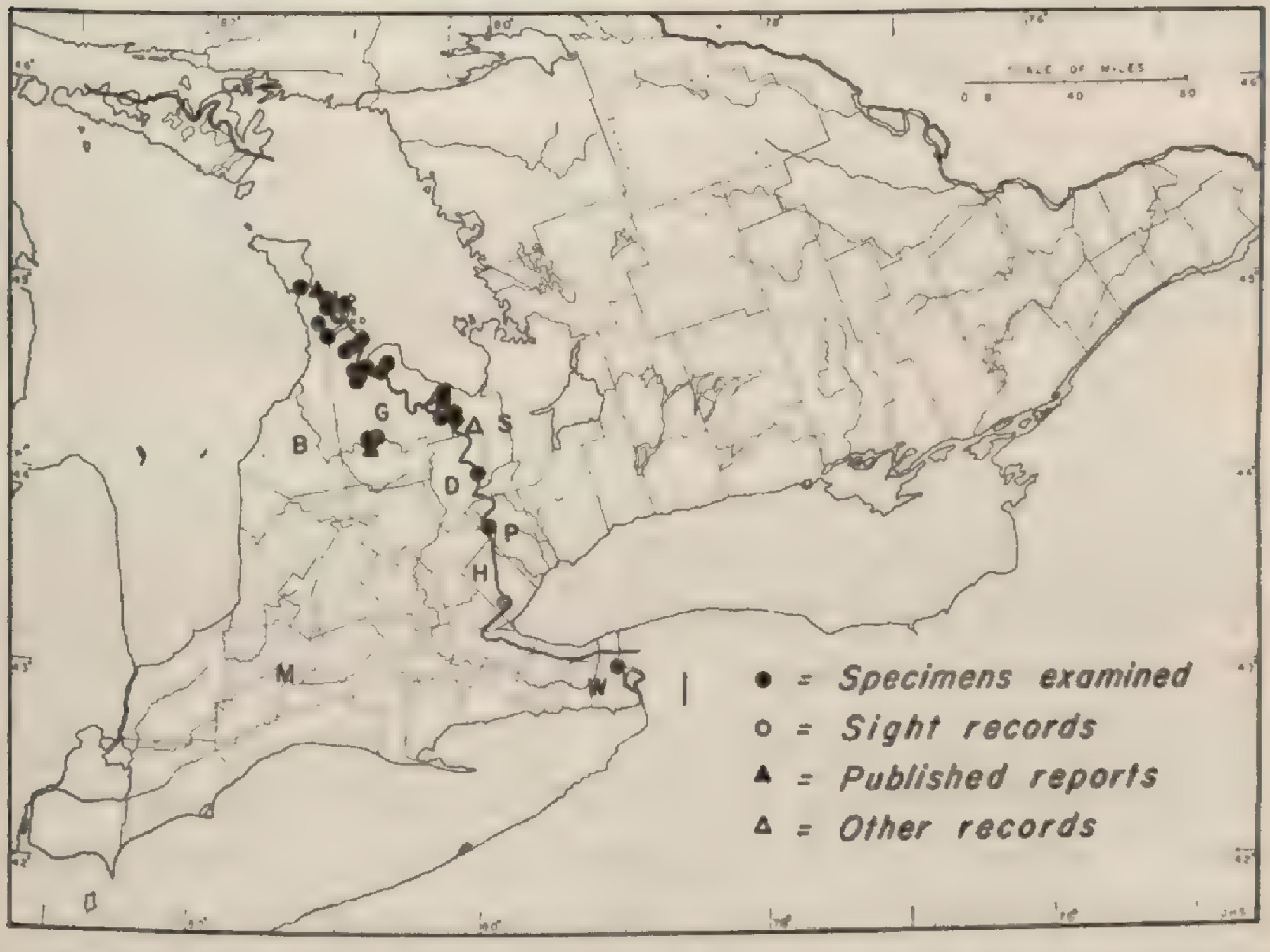

FIG. 1. Map of southern Ontario showing all known Ontario locations for *Phyllitis Scolopendrium*. Heavy line indicates position of the Niagara escarpment and its continuation in Manitoulin Is. Counties involved in discussion are lettered as follows: B = Bruce, D = Dufferin, G = Grey, H = Halton, M = Middlesex, P = Peel, S = Simcoe, W = Welland.

Island with its neighbours to the west constitute its extension in Ontario. Thence, it crosses the upper peninsula of Michigan and swings southward along the margin of that Lake. It forms the Door peninsula in Wisconsin but disappears west of Chicago. Thus, it partly encircles the Michigan basin into which the beds dip at the rate of 20 feet or more to the mile."

The most common types of habitat in which Hart's-Tongue occurs in Ontario are those connected directly with the limestone or dolomite exposures of the Niagara escarpment. Here the fern is generally found in more or less widely separated areas along the wooded talus slope of this prominent topographic feature, particularly on and among boulders. It also occurs in rocky woods along the top of the escarpment, often near the brow of the cliffs, in seams and crevices of the outcropping rocks. Occasionally, the latter type of habitat yields Hart's-Tongue at a distance of several miles from the actual edge of the escarpment. This is the case at stations near Mar and near Stokes Bay in the Bruce Peninsula.

However, in looking at the extent of the Niagara escarpment in Ontario as shown on the map, and after exploring this feature in the field, it has been a source of wonder to many Ontario naturalists that the Hart's-Tongue does not occur all along the escarpment from the Niagara Glen to the tip of the Bruce peninsula and on its continuation in Manitoulin Island. The late Hubert H. Brown, a keen amateur naturalist and pteridologist at Toronto, who knew several Hart's-Tongue stations around Owen Sound, Woodford, and elsewhere in Grey County, once admitted having "searched in many places from the Forks of the Credit along the limestone escarpment, Milton, Waterdown, Hamilton, Winona, Beamsville, DeCew Falls, Queenston, etc., but failed to find it." W. Sherwood Fox, in his charming book about the Bruce Peninsula (6), has devoted a chapter entitled "The Herb Called Hart's-Tongue" to the recounting of his many years of searching for this fern and the final rewarding discovery of its haunts in the peninsula. If we exclude a former occurrence in the Niagara Glen which would not strictly be on the escarpment, then the

part of the escarpment from which Hart's-Tongue has been collected is the section between Mount Nemo in Halton County at the south and near Lion's Head in the Bruce Peninsula, the northern limit of this fern in Ontario.

The other notable type of habitat is that of the Durham or Rocky Saugeen stations, where the fern is found in rocky wooded valleys of the upper tributaries of the Saugeen River. At these stations the river has cut a channel through the glacial deposits to the bedrock of Silurian limestones and dolomites, so that the same basic type of rock, together with shade and the moisture of the soil or atmosphere, is available to the fern.

HISTORICAL ACCOUNT

The first comprehensive report on the occurrence of the Hart's-Tongue in North America which discussed the Ontario stations was published by W. R. Maxon (14) in 1900. Three main stations were given for this province, namely Owen Sound, Durham, and Collingwood, all of which are in Grey County.[1] The most detailed account specifically for Ontario was that of A. B. Klugh, formerly a professor at Queen's University, Kingston. In 1905 Klugh published (10) an account of the localities then known to him, together with a sketch map. The most significant additions reported by Klugh were stations to the northwest of Owen Sound: McLean's Mountain, near Kemble, and north of Wiarton in Bruce County to an area between Hope Bay and Lion's Head. Thus two counties were then represented—Grey and Bruce.

A third county was added to the score when, in 1907, Mr. J. F. Calvert, of London, Ontario, discovered a small

[1] Although Collingwood itself is located in Simcoe County, it is close to the western boundary, and the locality known as the Collingwood station, being about seven miles west of Collingwood, is actually in Grey County.

station for Hart's-Tongue at the Mono Rocks, located on the Niagara escarpment in the township of Mono in Dufferin County. The addition of Peel, the fourth county, to the list apparently belongs to Mr. E. A. Moxley, of Westbrook, who reports[2] finding Hart's-Tongue at the Forks of the Credit in 1918. His report is substantiated by my collection from the same general vicinity in 1951. Reports for Creemore (1918), Glen Huron (1921) and Singhampton (1921) give Mr. Moxley credit also for adding Simcoe County as the fifth county represented by the Hart's-Tongue range. The earliest specimen I have seen from Simcoe County, however, is a collection made near Singhampton in 1940 by Dr. F. A. Clarkson of Toronto. Finally, the most recent discovery of this species at Mount Nemo in Halton County has added a sixth county and extended the range considerably farther south in Ontario.

Omitted from this chronological series is Welland County, a record based on specimens collected in 1895 and again in 1939 in or near the Niagara River gorge. As the Hart's-Tongue may not have been indigenous in that locality, the details of these records will be outlined in the following discussion of the various stations.

DISCUSSION OF STATIONS

Owen Sound stations.—A good description of the original locality at Inglis Falls was given by Maxon (14) and need not be repeated here. The Falls in question (also called Ingall's Falls and Sydenham Falls) are formed by the Sydenham River plunging over the edge of the escarpment into a narrow gorge, after which it passes through the horse-shoe shaped lowland area in the northern part of which the town of Owen Sound is centered, and empties finally into the Sound. The orig-

[2] In personal correspondence with the author, dated July 13, 1953.

inal discoverer of the Owen Sound station was Professor C. William Hincks (9), in 1857, and not Robert Bell, in 1861, as reported by Lawson (12).

A second station located a few miles north of the falls in the same vicinity was known as the "Rifle Range." In addition to these, a whole series of local names given on herbarium sheets indicates that other areas probably existed in the vicinity of Owen Sound, although some of these cannot now be traced. Hart's-Tongue was collected, for example, at Cherry's Farm, Cruickshank's Farm, Whyte's Woods, Lee's sideroad, Leith's Woods, Jones' Falls, Haston's Mill, Royston Park, Harrison Park, and Sydenham Falls. The last two of these refer to the valley and the gorge below Ingall's Falls on the Sydenham River. Further data on the types of habitats occupied by Hart's-Tongue in the Owen Sound district were presented by McColl (15) in 1925.

In spite of the repeated depletions[3] of these colonies by botanists, florists, and others, this fern has managed to persist in fair numbers at Owen Sound for a period now reaching almost one hundred years from the time of its discovery to the present. It was from the first-discovered station at Inglis Falls that M. L. Fernald collected material in 1934 which became the type of the American variety of *Phyllitis Scolopendrium* described by him in 1935 (4).

Durham station.—The second distinct locality is the Durham region,[4] and the Little Saugeen River,[5] where

[3] Out of the total of 126 specimens from Ontario seen by the writer, some 57 had been taken from Owen Sound localities.

[4] The inclusion of Durham County in the range of *Phyllitis*, as cited by M. L. Fernald in Gray's Manual (5, p. 42) and apparently copied by Gleason (7, p. 41) in Britton & Brown's Illustrated Flora, is obviously an error for the town of Durham, which is in Grey County. I have been informed by Dr. W. S. Fox that Fernald himself visited the Durham station during the Botanical Society's excursion to the Bruce Peninsula in June, 1934, at which time he left the party with the late Professor R. B. Thomson

it was discovered by H. M. Ami in 1883. At least two stands are known still to exist along the Rocky Saugeen River near Durham at Rocky Saugeen and below Hayward's Falls.

Niagara records.—Following in chronological order the next record would be the specimen collected in the Niagara Falls area (probably in the Glen of the Niagara River gorge) in 1895 by Wm. Scott. This record raises several questions, since the locality is about eighty-five miles from the nearest station to the northwest on the escarpment but is intermediate between the Canadian stations and the American ones near Syracuse in central New York state. No other records than that of Scott are known between 1895 and 1938, but from 1938 to 1945 the Hart's-Tongue was known to botanists and students working at the Niagara Parks Commission School for Gardeners, near the Glen. The main question is whether these reports stem from an indigenous stand in the Glen, since it is known that the Hart's-Tongue was transplanted to the gorge of the Niagara River (supposedly from central New York) by a Judge Clinton of Buffalo some time before 1882. It is not known exactly where Judge Clinton put this fern, but one of the more likely and accessible places would have been the Glen on the Canadian side of the river.

The second question regarding the Niagara Falls record is whether Hart's-Tongue still occurs there. It has not been reported from there since 1945 and several naturalists have made special searches in the vicinity

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at the Rocky Saugeen crossing near Durham Town to see a small station of the Hart's-Tongue. This fern is unknown in Durham County, Ontario, which is considerably east of the known stations along the Niagara escarpment.

[5] A typographical error for the name of this river in Macoun's Catalogue (13), where it appears as "Little Sau—" River, has been copied by Maxon (14) and others.

of the Niagara Glen since that time without success. Had there been an extensive natural stand in the Glen, then either some of the plants should still be there or there should have been more specimens reported and collected and (some at least) preserved since the collection made in 1895 by Wm. Scott. It does not seem impossible to consider that Judge Clinton's introduction was actually made in the Niagara Glen and that the fern established itself and persisted, forming the basis of Scott's and later discoveries there.

Collingwood station.—The first reports for this area date back at least to 1898, in which year Professor W. H. Jenkins of Owen Sound wrote to Maxon about the supposed occurrence of Hart's-Tongue at Collingwood, Ontario. Later confirmation established the locality as being about seven miles west[6] of Collingwood in the township of Collingwood, Grey County. This locality is in a part of the Niagara escarpment described by Chapman and Putnam (2, p. 135) as follows:

"The highest and most picturesque part of the escarpment is the Blue Mountain section near Collingwood, which stands over 1,000 feet above the waters of Georgian Bay. Here the dolomitic cap rock is exposed in cliffs 150 feet high, while huge blocks breaking away from the wall have left deep crevasses known as 'The Caves'."

The Caves (or "Scenic Caves") referred to above have been a local tourist attraction for many years and have provided both early and recent reports or collections of Hart's-Tongue.

Woodford stations.—The earliest record at hand for this locality is a collection made by James White in

[6] Maxon says (14, p. 38) "seven miles in a westerly direction . . . and about 50 miles east of Owen Sound." The latter estimate is in error since 50 miles by road or in a straight line east of Owen Sound would place the area east of both the escarpment and Collingwood.

1898. Woodford is a small community in Grey County about ten or twelve miles east of Owen Sound on the road to Meaford and Collingwood. The escarpment crosses this road just at Woodford and Hart's-Tongue occurs for some distance along it in both a northeasterly and a southwesterly direction. In an early account by H. Ransier (16) describing a journey by stage and on foot from Owen Sound, the presence of Hart's Tongue and Holly Fern along this ridge is reported, although the name Woodville is used for the community through which the ridge passes. Several collections made about three or four miles northeast of Woodford have been referred to Meaford on Nottawasaga Bay, but the collection localities would be about six or seven miles northwest of Meaford.

Early Records for Bruce County.—The first mention of Hart's-Tongue in the Bruce seems to be that by A. B. Klugh (10) who refers to its discovery three miles above Colpoy's Bay (just north of Wiarton) by W. E. Saunders in June, 1905. In August of the same year, Klugh spent some time investigating the area around Owen Sound and the Bruce Peninsula and was able to report Hart's-Tongue from outcrops and ridges intermittently from Owen Sound northward in the Peninsula to Hope Bay and to within a few miles of Barrow Bay just south of Lion's Head. The discoveries by Saunders and Klugh fixed the first stations at any distance north of Owen Sound by adding the localities of Kemble, McLean's Mountain, Colboy's Bay, Cape Croker, and Hope Bay. The McLean's Mountain station was visited also in 1909 by Ransier (16).

I have no record of any stations farther north along the east (escarpment) side of the Bruce than those reached by Klugh, but the actual northern limit has been extended by a recent collection by Vincent Elliott and W. Sherwood Fox from near Stokes Bay. This

extends the known range at least ten miles to the northwest and almost to the western side of the Peninsula. It will be interesting to note whether botanists in the future will be successful in locating Hart's-Tongue still farther north than this and, if so, how close to Tobermory at the tip of the peninsula. The recent discovery of Hart's-Tongue in the northern peninsula of Michigan (8) emphasizes the possibility that other sections of the Niagara escarpment or its continuation through Manitoulin Island may offer suitable habitats for this fern and should be searched more thoroughly.

Mono Rocks station.—About eight plants of Hart's-Tongue were discovered by J. F. Calvert in 1907 (1) in the township of Mono, Dufferin County, at what is known locally as the Mono Rocks. They were growing on a shaded cool hillside, facing east, which is part of the talus slope of the Niagara escarpment. The area has been revisited by botanists more recently (see Taylor (17), pp. 81–82) and is now the site of a thriving colony of Hart's-Tongue. If the stations near the Forks of the Credit River and at Mount Nemo develop in a similar manner, it might be postulated that this fern is spreading at least southwards along the Niagara escarpment.

Peel County records.—Although I now know that at least one other botanist has seen Hart's-Tongue in the Credit Forks vicinity and he at a much earlier date (E. A. Moxley in 1918, as noted above), my own discovery in the same general area in 1951 started this investigation into the Hart's-Tongue range. The discovery occurred during a weekend's respite from the marking of examination papers in late April, 1951, when, in company with three University colleagues, I was enjoying a leisurely ramble along the base of the Niagara escarpment near the Credit Forks. Although it was the first trip into the field that season, the purpose was not to

collect plants, but rather to observe and enjoy the unfolding of spring wherever and whenever opportunities presented themselves. It was a real surprise when, in the process of checking off the species of plants on my sight card, I spotted at the base of the talus slope a small boulder bearing a single plant of Hart's-Tongue growing from a crevice on its side. In the next few minutes the combined efforts of all four of us yielded several other similar boulders with the fern growing on them. It was not an extensive stand, but gave every indication of being a natural one. A single and somewhat depauperate plant was taken for a specimen to record this discovery.

Simcoe County records.—In the fall of 1952, Dr. F. P. Ide of the Department of Zoology, University of Toronto, furnished specimens collected in the southwestern part of Simcoe County. In this region the escarpment enters from Grey County at the west and turns south to pass into Dufferin County. Since Hart's-Tongue occurs along the escarpment at the Caves (Grey County) and at Mono Rocks (Dufferin County), it was to be expected that it might also be found on the short portion in Simcoe County. It was on this section of the escarpment that Dr. Ide found both the Hart's-Tongue and the Holly Fern.

Several months after receiving these records a small specimen turned up among material being prepared for the herbarium which proved to be an earlier record for Simcoe County. The specimen in question was one collected by Dr. F. A. Clarkson just northeast of Singhampton in the fall of 1940. Singhampton is located at the head of a narrow gorge where the Mad River plunges over the escarpment.

Still later, correspondence with E. A. Moxley uncovered the fact that he had known of Hart's-Tongue in the vicinity of Creemore, Glen Huron, and Singhamp-

ton as early as 1921. These localities are all in Simcoe County on or near the Niagara escarpment.

Halton County records.—The southern limit of Hart's-Tongue in Ontario has been greatly extended by the recent collection from Mount Nemo in Halton County. On October 4th, 1953, Professor F. P. Ide and three biology students were searching for solution caves in that part of the escarpment when they made the discovery. They found the Hart's-Tongue growing at the crest of a deep rift in the limestone near the prominently exposed cliff known as Mount Nemo.

SUMMARY OF DATA

The distribution map (Fig. 1) has been based on the data obtained from 126 specimens examined, together with any published reports, sight records, or other information available. The following list gives only those records which have been plotted, the many duplicates from some stations being omitted:

BRUCE: East of Stokes Bay Village, Aug. 24, 1952, *W. S. Fox & V. Elliott* (TRT)[7]—the northernmost record; rocky wooded ridge northwest of Hope Bay, June 7, 1952, *J. H. Soper* 5468 (TRT); moist rocky woods southwest of Hope Bay, July 19, 1935, *P. V. Krotkov* 10027a (TRT); calcareous rocks of the talus slopes of the cliffs around the bay, Cape Croker, July 9, 1936, *Fr. Marie-Victorin et al.* 45908 (MT); Wiarton, July 23, 1907, *M. Wilkes* (TRT); Purple Valley, Aug. 25, 1932, *H. H. Brown* (TRT); Mar, [date not stated], *A. H. Richardson* (McM); two miles south of Lion's Head—Klugh (11). DUFFERIN: Crevices of talus blocks in shade of deciduous trees, Mono Rocks, Nov. 3, 1933, *T. M. C. Taylor* 8349 (TRT). GREY: Rocky woods near Clavering, Aug. 1, 1938, *H. H. Brown* (TRT); mossy boulder at base of escarpment in woods near Lindenwood, June 6, 1952, *Soper & Rothfels* 5456

[7] Abbreviations for herbaria are as follows: CAN—National Museum of Canada, Ottawa, Ontario: McM—McMaster University, Hamilton, Ontario; MT—Herbier Marie-Victorin, Institut Botanique, Université de Montréal, Montreal, Quebec; NPC—Niagara Parks Commission, School for Apprentice Gardeners, Niagara Falls, Ontario; TRT—Department of Botany, University of Toronto, Toronto, Ontario.

(TRT); crevices in limestone rocks north of Kemble, June 3, 1948, *Soper & Dale* 3825 (TRT); in horizontal seams of dolomite in deciduous woods, Ingall's [Inglis] Falls, June 19, 1934, *M. L. Fernald* 3040 (CAN—ISOTYPE); limestone rocks in deep shade, Harrison Park, Owen Sound, Aug. 1920, *W. R. McColl* (TRT); on shaded limestone, Leith Woods, Owen Sound, Sept. 20, 1914, *W. R. McColl* (TRT); Woodford, Sept. 22, 1898, *J. White* (TRT); talus slope, St. Vincent Tp., near [northwest of] Meaford, Aug. 26, 1950, *Montgomery & Beamer* (TRT); rich woods with some limestone outcrop, north of McIntyre, Aug. 21, 1947, *H. H. Brown* (TRT); shady limestone talus near "Scenic Caves", Aug. 23, 1937, *H. H. Brown* (TRT); lot 8, conc. II, Collingwood Tp., Oct. 11, 1952, *F. P. Ide* (TRT); rocky gorge along river near Rocky Saugeen, June 10, 1952, *Soper & Rothfels* 5525 (TRT); rocky wooded slope of ravine, below Hayward's Falls, Rocky Saugeen River, June 10, 1952, *Soper & Rothfels* 5518 (TRT); on limestone, Kolapore, Aug. 9, 1953, *M. L. Heimburger* 1170 (JHS: sight record); on Guelph dolomites, Little Sau-[geen] River, Durham—Macoun (13). HALTON: In crevasse of limestone pavement along top of escarpment, Mount Nemo, Oct. 4, 1953, *R. L. & J. C. Pearson, F. P. Ide and J. L. Price* (TRT). PEEL: On scattered boulders at foot of talus slope of Niagara escarpment near Inglewood (south of Credit Forks), Apr. 28, 1951, *J. H. Soper et al.* 5155 (TRT). SIMCOE: Devil's Glen, east of Singhampton, Oct. 10, 1940, *F. A. Clarkson* (TRT); near Duntroon, Oct. 26, 1952, *F. P. Ide* (TRT); near Creemore, 1918, *E. A. Moxley* (corr. JHS). WELLAND: Niagara Falls, Sept. 21, 1895, *Wm. Scott* (TRT); [Niagara] Glen, Aug. 30, 1939, *G. H. Hamilton* (NPC). EXCLUDED RECORD: A specimen labelled "shaded cliffs, London [without date] *R. T. Anderson*" in the Herbarium of the Department of Botany, University of Toronto, has not been accepted as correctly labelled. There are no exposures of limestone or dolomite in the vicinity of London nor have any of the local botanists or naturalists reported this fern from that region. It is known that R. T. Anderson was a student at this University and that he visited Georgian Bay on one or more occasions. The specimen may have been collected in the Georgian Bay region somewhere along the Niagara escarpment. Any record for London, Ontario, is almost certainly an error.

The following brief summary of the records by county may be of interest. The doubted record for Middlesex

is not included in the table.

COUNTY	NO. OF STATIONS	NO. OF SPECIMENS	DATES OF SPECIMENS	FIRST RECORD
Bruce	6–9	20	1907–1952	Klugh (1905)
Dufferin	1	6	1933–1952	Calvert (1907)
Grey	14–16	93	1857–1953	Hincks (1857)
Halton	1	1	1953	Pearson, Ide et al. (1953)
Peel	1–2	1	1951	Moxley (1918)
Simcoe	3	3	1940–1952	Moxley (1918)
Welland	1 (+1?)	2	1895–1939	Scott (1895)

Totals: 27–33 (+1?) stations
126 specimens

THE HOLLY FERN IN SOUTHERN ONTARIO

As mentioned earlier, the Holly Fern (*Polystichum Lonchitis* (L.) Roth) is a frequent associate of the Hart's-Tongue in Ontario, their ranges being essentially the same over most of Bruce and Grey counties. The Holly Fern, however, occurs throughout the Bruce, from Wiarton to Tobermory (see Fig. 2), whereas the Hart's-Tongue has not been found as yet north of Stokes Bay. Conversely, the Holly Fern does not extend along the Niagara escarpment south of Grey County with the exception of a single station in the Niagara Glen, Welland County. Holly Fern has also been collected around the southeast shore of Lake Superior at Batchawana Bay (Algoma District, Northern Ontario), and from several points in Michigan along or near the south shore of Lake Superior. These latter localities cannot be included on the map used here.

These two ferns have been mentioned by Fassett (3) as an example of the general phenomenon that "two species sometimes occupy the same habitat, but one is more limited than the other." Perhaps the type of

habitat necessary for the establishment and survival of plants or colonies of Hart's-Tongue is based on a greater number of factors than that required by the Holly Fern. In attempting to explain the differences in their ranges one would have to examine not only the ecological factors but also the historical ones, such as former ranges and routes of migration, in terms of the glacial history of the areas involved.

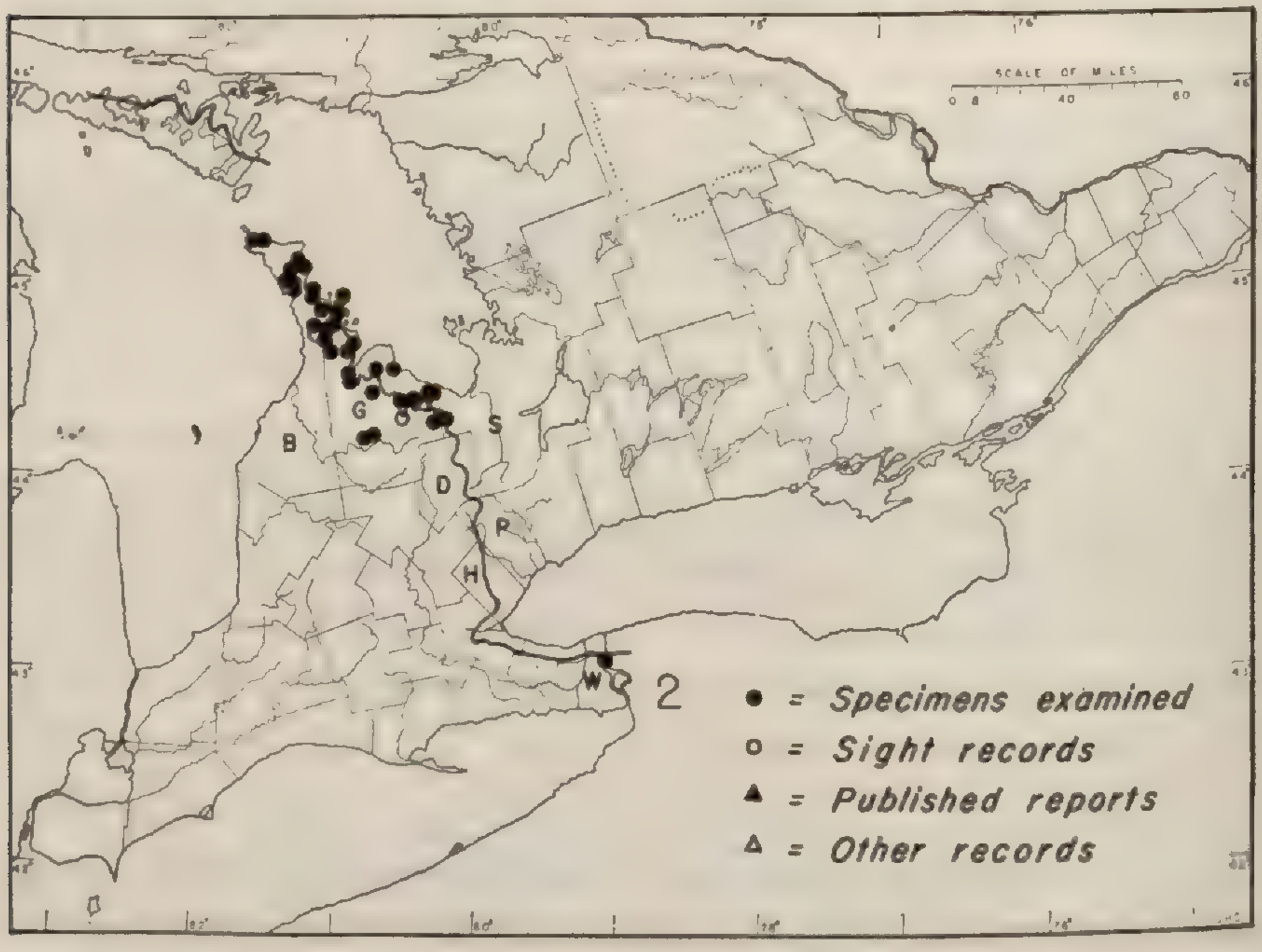

FIG. 2. Map of southern Ontario showing only southern records for *Polystichum Lonchitis.* (Algoma records are off the map at northwest.) Niagara escarpment and counties indicated as in Fig. 1.

Representative Specimens of Polystichum Lonchitis:—ALGOMA [not included on map]: Thin soil on lava, Batchawana Falls, Aug. 29, 1935, *T. M. C. Taylor et al.* 125 (TRT). BRUCE: Crevices in the rocks in Jack Pine Woods, south of Tobermory, July 17, 1936, *P. V. Krotkov* 10116 (TRT); crevices in maple woods, near Purple Valley, June 5, 1950, *Soper & Shields* 4577 (TRT). GREY: Owen Sound, 1869, *Mrs. Jessie Roy* (CAN); limestone talus, Rifle Range, Owen Sound, Aug. 27, 1932, *T. M. C. Taylor* (TRT); on rocky slope in shade of maples and elms, near Kemble, June 3,

1948, *Soper & Dale* 3821 (TRT); rocky slope below ridge of escarpment, near Lindenwood, June 6, 1952, *Soper & Rothfels* 5458 (TRT); rocky wooded ravine along Rocky Saugeen River below Hayward's Falls, June 10, 1952, *Soper & Rothfels* 5517 (TRT); talus slope below escarpment near Epping, Aug. 11, 1952, *J. H. Soper* 5774 (TRT). SIMCOE: Along rocky wooded ravine of Mad River between Singhampton and Glen Huron, June 29, 1950, *Soper & Shields* 4833 (TRT). WELLAND: Damp rocky soil, Niagara Gorge, Aug. 20, 1948, *Bert Miller* (McM). EXCLUDED RECORD: On his map of the North American Range of *Polystichum Lonchitis*, Fernald (4, map 3, p. 207) shows a record for the north shore of Lake Erie. I have not been able to trace the origin of this record but believe it to be erroneous, since no other reports have been seen for that district.

SUMMARY

An attempt has been made to map accurately the known range in Ontario of the Hart's-Tongue Fern (*Phyllitis Scolopendrium*) and to present a historical account of the discovery of the various stations. Two counties have been added which seem not to have been previously reported (Halton and Peel) and one deleted (Durham) which has been erroneously included in several publications. Discussions of the various stations and citations of specimens have been included. This study shows that a large number of separate stations for Hart's-Tongue are known along the Ontario portion of the Niagara escarpment and suggests that continued investigations in the field will probably disclose still more within the limits shown if not also additional ones to the north of those shown. In general, many parts of the escarpment have been little explored botanically. For comparison, the range of the Holly Fern (*Polystichum Lonchitis*) has been discussed and mapped for southern Ontario only, with citation of representative specimens.

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REFERENCES

1. CALVERT, J. F. 1908. Hart's-Tongue Fern. Ont. Nat. Sci. Bull. no. 4, p. 10.
2. CHAPMAN, L. J., & D. F. PUTNAM. 1951. The Physiography of Southern Ontario. Univ. of Toronto Press. xxi + 284 pp.
3. FASSETT, N. C. 1942. Populations of *Linaria* on the Gulf Coast. Amer. Journ. Bot. **29**: 351–352.
4. FERNALD, M. L. 1935. Critical Plants of the Upper Great Lakes Region of Ontario and Michigan. Rhodora **37**: 197–222; 238–262; 272–301; 324–341.
5. FERNALD, M. L. 1950. Gray's Manual of Botany. 8th edition. American Book Co. lxiv + 1632 pp.
6. FOX, W. SHERWOOD. 1952. The Bruce Beckons. Univ. of Toronto Press. xviii + 235 pp.
7. GLEASON, H. A. 1952. Britton & Brown's Illustrated Flora of the Northeastern United States and adjacent Canada. 3rd edition. New York Botanical Garden. 3 vols.
8. HAGENAH, D. J. 1953. Rare Hart's-tongue Fern found in Michigan. Cranbrook Inst. Sci., Newsletter, **23**: 2–5.
9. H. [INCKS], W. 1864. Review of "Synopsis of Canadian Ferns and Filicoid Plants.' Can. Journ. **9**: 348–351.
10. KLUGH, A. B. 1905. *Scolopendrium vulgare* in Ontario. Fern Bull. **13**: 104–106; map.
11. KLUGH, A. B. 1906. The Fern Flora of Ontario. Fern Bull. **14**: 65–74.
12. LAWSON, G. 1864. Synopsis of Canadian Ferns and Filicoid Plants. Can. Nat. & Geol., ser. 2, **1**: 262–300.
13. MACOUN, J. 1890. Catalogue of Canadian Plants. Pt. 5, pp. 249–428. Dawson Bros., Montreal.

14. MAXON, W. R. 1900. On the Occurrence of the Hart's-tongue in America. Fernwort Papers, presented at a meeting of fern students, held in New York City, June 27, 1900, pp. 30–46.
15. MCCOLL, W. R. 1925. Data on *Scolopendrium vulgare* J. E. Smith. Amer. Fern Journ. **15**: 90–93.
16. RANSIER, H. 1913. Hunting the Hart's-tongue and Holly Fern at Owen Sound, Ontario. Amer. Fern Journ. **3**: 25–37.
17. TAYLOR, T. M. C. 1934. Notes on Some Ontario Pteridophytes. Amer. Fern Journ. **24**: 79–83.

A Note on a Species of Cyathea

C. V. MORTON

Cyathea gemmifera Christ ex Jimenez, Bol. de Fomento [Costa Rica], Año III, No. **9**: 664. 1913 (excl. *figs. 1–6*).

This species has apparently never been placed. The specimen designated as type in the original description is Herb. Jimenez, No. 913, collected by A. Tonduz at Cerros del Tremedal, San Ramón, Costa Rica, April, 1913. I have not seen the actual type, but there is in the National Herbarium an isotype received from the Museo Nacional de Costa Rica. This bears the number Herb. Nat. Cost. 17563. The data on the label read as follows: "*Collines de Tremedal, près de San Ramon. Arborescente 3–5 m. de haut, 7–10 cm. de diam. Nombreux bourgeons le long du stipe. 1,300–1,400 meters. 21 Avril, 1913.*" The specimen is sterile, as was the one seen by Christ. However, additional material of this collection received from Tonduz has two partially fertile pinnae, as well as one of the stipe buds mentioned on the label. These specimens are all *Cyathea mexicana* Schlecht. & Cham. The significance of the stipe buds, stressed by Christ as the distinctive characteristic of *Cyathea gemmifera*, must await field studies.

At a slightly later date Jimenez sent to Dr. Christ a

second, fertile collection from San Ramón (Hacienda Volio, July, 1913, *Jimenez* 909), which Christ identified with the sterile material that he was calling *C. gemmifera,* erroneously, however, for it represents an entirely different species, *Cyathea hemiotis* Christ, which is itself probably only a form of *C. Werckleana* Christ. Christ's original description was based wholly on the original sterile material, but, unfortunately, the six figures published by Jimenez are all based on the fertile material of *C. hemiotis.*

The additional two specimens cited by Jimenez (Herb. Jimenez 914 = Herb. Nat. Cost. 17565 [erroneously 17765 on some labels], *Bois de San Pedro, près de San Ramon,* 1,300–1,400 meters, April 5, 1913, *Tonduz;* and Herb. Jimenez 915 = Herb. Nat. Cost. 17564, *Forêts des collines de Santiago, près de San Ramon,* 1,500–1,700 meters, April 19, 1913, *Tonduz*) are both *Cyathea mexicana.* There is no evidence that Christ saw either.

The Toxicity of Equisetum

WILLIAM F. RAPP, JR.

Recently the American Fern Journal published two short notes dealing with the toxic effect of *Equisetum* on horses. The first, by Kane (1949: 59) was an excerpt from a letter which had been published in *The New York Times.* This paper suggested that the high silica content of *Equisetum* caused "scours" in horses. The second, by Gasser (1949: 123) called attention to the fact that *Equisetum* contained a toxic alkaloid and suggested that this was the causal agent for the poisonous effect.

The poisonous nature of the various species of *Equisetum* has been known for a long time, at least to European workers. Frohner (1927: 342) gives an excellent review of the status of *Equisetum* poisoning in Europe.

The first accounts of *Equisetum* poisoning in the United States were made by Dr. F. A. Rich, a veterinarian at the Vermont Agricultural Experimental Station. In 1902 Rich published two papers (1902 and 1902b) which are identical except that they appeared in different journals. Rich and Jones (1902) also published an experimental station bulletin on the same subject, in which they stated: "This plant, *Equisetum arvense*, causes much and frequently fatal poisoning of horses throughout Vermont." Rich (in Rich and Jones 1902: 188) states: "During the past two years one of the authors in his professional work about Burlington [Vermont] has had twenty-three cases unquestionably due to this form of poisoning, while his records show forty-one cases which he has attended within five years." As a result of the amount of *Equisetum* poisoning among the horses of Vermont, Rich undertook a series of experiments in which he fed horses on *Equisetum*. As a result of these experiments, Rich (1902a: 947) described the symptoms: "Loss of coordination of muscular movement, beginning as a slight unsteadiness or uncertainty of gait, most marked when excited." On page 949, Rich states: "The horse finally dies from exhaustion induced by trauma and frequent attempts to rise."

Muenscher (1939: 27) gives the following symptoms for *Equisetum* poisoning: "At first, unthriftness and loss of weight, followed by a loss of muscle control —sways and staggers, loses power to stand and becomes very nervous and struggles violently to get up; willing to eat, but unable to rise, dies from exhaustion." The following pathological symptoms occur at the same time: "pulse becomes slow until toward the end, when it is rapid and weak; temperature below normal until animal goes down; then some fever develops, extremities are usually cold; visible lining membranes of mouth, nose and eyes become pale."

Frohner (1927: 342) states that upon autopsy horses which die from *Equisetum* poisoning show: "Hyperaemia, oedema, dropsical effusions on the brain and spinal cord, especially on the cerebellum; in cases of longer duration, hydraemia."

Most workers add that young animals develop symptoms and succumb to the poisonous effects of *Equisetum* much more rapidly than older ones. It has also been shown that the plant is more toxic when fed dry, as in hay, than when eaten in a pasture.

The majority of published statements limit *Equisetum* poisoning to horses, but Pammel (1911: 325) states: "In cattle it produces diarrhoea and cows become poor and the milk flow ceases or is checked." Gail and Hahner (1916: 14) said there was no serious effect upon cows, but that they were uncertain as to the effect upon sheep.

Rich in his work (1902a: 953) attempted to find the toxic principle of *Equisetum*, but had little success. His chemical analysis was as follows:

Moisture (as received)	14.31%
Dry matter	85.69%
	100.00%
Crude ash	19.40%
Crude protein	10.94%
Crude fiber	21.30%
Nitrogen free extract	46.30%
Crude fat (ether extract)	2.06%
	100.00%
Nitrogen	1.75%
Phosphoric acid	0.61%
Potassium oxide	4.07%
Calcium oxide	4.01%

From the above analysis he was unable to name any particular compound as the toxic principle. In view of our modern knowledge of chemistry it is difficult to see how Rich could hope to determine the toxic ingredient by his method of analysis.

In spite of the toxic effect on horses, *Equisetum* has been used as a drug. Young (1886 : 419) studied *Equisetum hyemale* to determine its value as a medical plant. According to him, *Equisetum hyemale* was to some extent employed to remedy dropsical affections and was known to be prescribed in infusion together with digitalis and potassium acetate. As a result of his analysis, Young concluded that the effect of the medicine would have been the same if the *Equisetum* had been omitted. Young's analysis was as follows: Ash 18.2% (mostly silica); petroleum benzine exhausted from the powder 1.4% of a brownish-green semi-liquid fixed oil, which was readily saponified and was soluble in ether, chloroform and carbondisulfide; ether now took up 5.33% of a green semi-solid resin, soluble in chloroform, benzol and absolute alcohol and imparting to water or acidulated water a greenish color; 2.25% was shown by Fehling's solution to be sugar. As a result of this analysis, Young was unable to name any compound as toxic or as having medicinal properties.[1]

Various workers have stated that the toxic principle in *Equisetum* is an organic acid which has been assigned the name "equisetic acid." However, although the name "equisetic acid" occasionally appears in the literature, all efforts to trace the origin of the name have been fruitless. *The Merck Index* (1952: 390) states that equisetic acid is synonymous with aconitic acid

[1] It is interesting to note that in spite of Young's work in 1886, the twelfth edition of the U. S. Dispensatory (1918) still listed *Equisetum* as having medicinal properties, saying that it was used sometimes in dropsical and renal diseases.

(1,2,3-propenetricarboxylic acid) and on page 16 adds that aconitic acid is found in the leaves and tubers of *Aconitum napellus* L. and various species of *Achillea* and *Equisetum*. Muenscher (1939: 77), in his work on poisonous plants, states that all these plants are toxic to horses and sheep. Thus, it may be assumed that aconitic acid is one of the toxic principles in *Equisetum* poisoning.

Other workers have been interested in the alkaloids of *Equisetum*. Lomann (1904: 69) isolated an alkaloid from *Equisetum palustre* which he called "equisetin." In his recent work on plant alkaloids, Henry (1949) does not list the alkaloid "equisetin," but states that the alkaloid "palustrine" has been isolated from *E. palustre*. The alkaloid "palustrine" was isolated by Karrer and Eugster (1948), but only its chemical properties were studied. Manske (1942) was able to isolate a volatile base alkaloid from *E. arvense*. He identified this compound as 3-methoxy-pyridine and stated: "There is therefore no question but that at least one species of *Equisetum* contains this, perhaps the simplest of natural alkaloids." Manske and Marion (1942) were able to isolate nicotine from *E. arvense*. Oficjalski (1937: 470) isolated the alkaloid lycopodine from *Equisetum arvense* and found the toxic dose for cats ranged from 0.005 to 0.05 grams per kilogram of body weight. As a result of these recent studies on alkaloids, we must assume that probably the most toxic principles found in *Equisetum* are plant alkaloids.

PRESENT DAY STATUS OF EQUISETUM POISONING

Many state agricultural experiment stations publish bulletins of poisonous plants and many of these have been examined. Of the ones examined, three mentioned *Equisetum*. Stevens (1933: 17) writing on North Dakota says that some cases have been reported. Tehon, Morrill and Graham (1946: 25–27) discuss the plant in Illinois,

but do not give any details as to the frequency of poisoning. Lee and Doyle (1940: 13) list the plant as of minor importance in Indiana.

In addition to examining bulletins on weeds, questionnaires were sent to a number of experiment stations. In Massachusetts, Dr. K. L. Bullis (letter, Jan. 29, 1951) stated that there seemed to be no record of cases of *Equisetum* poisoning. Dr. W. W. Robbins (letter, Feb. 7, 1951) reported that in California there are some losses of livestock due to *Equisetum*, but that *Equisetum* is not regarded as one of the primary poisonous plants. Dr. John H. Helwig, of The Ohio State University (letter, Jan. 22, 1951) claimed that they have no experience with *Equisetum* poisoning in Ohio. Dr. W. D. Bolton, of the University of Vermont, stated (letter, Jan. 22, 1951) that *Equisetum* poisoning probably occurs occasionally in the state. In Iowa, Dr. Richard W. Pohl mentioned (letter, Jan. 24, 1951) that as far as he knew, no cases of *Equisetum* poisoning had been reported. In Kansas, Dr. L. M. Roderick, of Kansas State College, (letter, Jan. 20, 1951) said that their attention had never been called to any cases of *Equisetum poisoning*. In Michigan, Dr. R. A. Rummells, of Michigan State College, (letter, Jan. 19, 1951) stated that *Equisetum* poisoning occurs in Michigan, but that the cases reported are never very numerous. In Illinois, Dr. C. C. Morrill, of the University of Illinois, (letter, Jan. 19, 1951) said that they do not see cases of *Equisetum* poisoning very often.

CONCLUSIONS

It would appear that *Equisetum* poisoning in horses is due to the presence of aconitic acid and to the presence of one or more alkaloids. The distribution of *Equisetum* poisoning in North America is not well known, because with the decrease in the number of horses on American farms, marked cases of *Equisetum* poisoning are seldom seen today.

REFERENCES

FROHNER, E. 1927. Lehrbuch der Toxikologie für Tierarzte. vii + 422. Verlag von Ferdinand Enke, Stuttgart.

GAIL, F. W. and A. R. HAHNER. 1916. Some Poisonous Plants of Idaho. Univ. Idaho Agric. Exper. Sta. Bull. 86.

GASSER, G. W. 1949. Horsetails and Horses Again. Amer. Fern Journ., 39: 123.

HENRY, THOMAS ANDERSON. 1949. The Plant Alkaloids. Blakiston, Philadelphia.

KANE, F. E. 1949. Horsetail: Bad for Horses. Amer. Fern Journ., 39: 59.

KARRER, P. and C. H. EUGSTER. 1948. Ueber ein Alkaloid aus Equisetum palustre. Helvetica Chimica Acta., 31: 1062–1066.

LEE, OLIVER C. and L. P. DOYLE. 1940. Indiana Plants Poisonous and Injurious to Livestock. Purdue Univ., Extension Bull. 240.

LOMANN, C. F. 1904. Ueber die Giftigkeit der deutscher Schachtelmarten insbesondere des Duwacks (Equisetum palustre). Arbeit. d. Deutsch. Landw. Gesell., Heft 100: 69.

MANSKE, RICHARD H. F. 1942. Plant Alkaloids. Canadian Journ. Res., 2 (esc. B): 265–267.

MANSKE, RICHARD H. F. and L. MARION. 1942. The Alkaloids of Lycopodium Species. Canadian Journ. Res., 2 (sec. B): 87–92.

MUENSCHER, WALTER C. 1939. Poisonous Plants of the United States. Macmillan, New York.

OFICJALSKI, S. 1937. Bul. Sci. Pharmacol., 44: 470.

PAMMEL, L. H., 1911. A Manual of Poisonous Plants. Torch Press, Cedar Rapids, Iowa.

RICH, F. A. 1902. Equisetum Poisoning. Proc. Amer. Veterinary Med. Assoc. Session of 1902: 178–186.

RICH, F. A. 1902a. Equisetum Poisoning. Amer. Veterinary Rev., 26: 944–951.

RICH, F. A. and L. R. JONES. 1902. A Poisonous Plant, the Common Horsetail, Equisetum arvense. Vermont Agric. Exper. Sta. Bull. 95.

STEVENS, O. A. 1933. Poisonous Plants and Plant Products. North Dakota Agric. Col. Bull. 265: 17.

TEHON, L. R., C. C. MORRILL, and ROBERT GRAHAM. 1946. Illinois Plants Poisonous to Livestock. Univ. Illinois. Cir. 599.

YOUNG, FRANK J. 1886. Equisetum hyemale. Amer. Journ. Pharmacy, 58: 419–420.

430 IVY STREET, CRETE, NEBRASKA

Polypodium aureum in Florida and Georgia

WILBUR H. DUNCAN

Mr. James Hardin and I on 10 October, 1952, botanized in Glynn County, Georgia, on a very small island in the salt marsh along Little Satilla River about 4.5 miles west of the center of Colonels Island. We were looking for plant material in connection with extensive poisonous plant studies which were in progress. The common trees on the island were *Quercus virginiana*, *Sabal palmetto*, *Juniperus virginiana*, and *Ilex vomitoria*. Growing from among the leaf bases of a *Sabal palmetto* we saw a large plant of *Polypodium aureum*. After removing some of the lower persistent leaf bases with an axe Mr. Hardin was able to climb the tree and obtain some specimens (*Duncan* 14425 *and Hardin*), one of which is deposited in the University of Georgia Herbarium.

Neither of us had seen this fern outside of Florida. Also, literature did not reveal a record of this fern from Georgia, McVaugh and Pyron (1951) not including it and Small (1938) reporting the species in the United States from Peninsular Florida and the Florida Keys. Correll (1938) reports the species only as far north as Duval County, Florida. This is not many miles south of Georgia.

Fortified with the above data it seemed to me that this fern had never before been seen in Georgia and I decided to determine as accurately as possible its known distribution. I did not know that Mrs. M. W. Diddell had seen this species in Chatham County, Georgia, in the spring of 1951—her published record of it did not appear until late in 1953 (Diddell, 1953). Since this species is not easily confused with any other one in the Southeast and the records of it, therefore, are easily ob-

tainable, information concerning collections of *P. aureum* was solicited from persons at various herbaria. This assistance is much appreciated and will be most happily repaid with provision of whatever data may be requested from the University of Georgia Herbarium.

A map (Fig. 1) has been prepared to show the distri-

FIG. 1. Distribution of *Polypodium aureum*.

bution data which have been accumulated for *P. aureum*. The circles with cross lines indicate the counties reported for this fern by Correll (1938) and the large dots those counties for which one or more additional herbarium specimens have been located. The empty circles represented localities where this fern has been observed by Mr. James D. Blake. This information was conveyed to me in a letter of 27 June, 1953, from him at the Department of Botany, Florida State University, where he was a graduate student, and is presented here with his approval. Although the palm tree seems to be a favorite habitat for the fern, it has been reported on other tree species and even on rock outcrops. Mr. Hardin told me of seeing this fern in soil of an old spoils bank of a phosphate pit in Polk County, Florida. Mr. Blake writes that the Nassau County record is based on a large specimen seen in the fork of *Nyssa aquatica* L. This seems odd to him since in a very large, nearby colony of *Sabal palmetto* not a single *P. aureum* is to be seen.

The triangle on the map indicates the location of Mrs. Diddell's record for *P. aureum* in Chatham County, Georgia. The distributional data are completed by the square locating the Glynn County collection made by Mr. Hardin and myself.[1]

Now that several ferns generally found in Florida only (e.g., *Polypodium aureum, Salvinia rotundifolia, Vittaria lineata, Psilotum nudum, Ophioglossum petiolatum*) have been reported north of Florida it is interesting to speculate whether or not additional searches will locate in south Georgia and/or South Carolina stations for other species which are not now known north of Florida. Only time and effort will bring an answer to this.

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[1] Mr. Hardin informs me that the Glynn County station has just been destroyed by a new highway.—Ed.

LITERATURE CITED

CORRELL, D. S. 1938. A county check-list of Florida ferns and fern allies. Amer. Fern Jour. 28: 92.

DIDDELL, M. W. 1953. Fern notes. Amer. Fern Jour. 43: 114–117.

MCVAUGH, ROGERS and J. PYRON. 1951. Ferns of Georgia. 195 pp. Univ. of Georgia Press, Athens, Georgia.

SMALL, J. K. 1938. Ferns of the Southeast. 517 pp. The Science Press, Lancaster, Pa.

Shorter Note

NEW STATIONS FOR DRYOPTERIS SETIGERA.—During the past year, four new localities for *Dryopteris setigera* (Blume) Kuntze have been found in Alabama. On August 9, 1953, Dr. R. L. Chermock, Associate Professor of Zoology at the University of Alabama, collected specimens of the fern near Brooklyn in Conecuh County near Saunders' Cave. On August 23, 1953, Dr. Chermock again collected the fern near Tuskegee in Macon County. Mr. Riley Lumpkin, a graduate student at the University of Alabama, collected the plant along U. S. Highway 80 one mile south of the Lee County line in Russell County on September 10, 1953. On April 24, 1954, the writer found a new station for the fern in Conecuh County approximately one and three-fourths miles southwest of Evergreen. The latter station is approximately three-fourths mile southwest of the original station for Alabama reported by the author.[1]

Previous to this report, the distribution of the fern as known to occur in the United States was Hernando, Highlands, Manatee, Orange, Osceola, Polk, Saint Johns, Seminole, and Volusia Counties of North Central Florida; Conecuh County, Alabama; and Newton County, Texas, the latter being reported by Dr. D. S. Correll.[2] Marion County may be added in the distribu-

[1] This JOURNAL 39: 124. 1949.
[2] This JOURNAL 41: 124. 1951.

tion for Florida, as the fern was observed by the writer while on a vacation tour on August 25, 1953, growing along several small streams in shaded areas in the vicinity of Dunnellon; however, no collections were made of the fern.

Five stations representing three counties are now known for Alabama. The collection by Mr. Lumpkin has extended the range from the original station to one hundred and ten miles eastward and ninety miles northward. Without doubt additional searches for the fern will reveal more new stations and it is certain that Florida's monopoly on it no longer exists.

Specimens documenting this report are deposited in the Herbarium of the University of Alabama and the personal collection of the writer, as follows: *R. L. Chermock:* CONECUH COUNTY, Saunders' Cave near Brooklyn in valley, partially shaded on limestone outcropping, August 9, 1953. MACON COUNTY, near Tuskegee in a ravine near spring in partial shade, August 23, 1953. *R. Lumpkin:* RUSSELL COUNTY, one mile south of Lee County line along U. S. Highway 80, September 10, 1953. *L. C. Crawford:* CONECUH COUNTY, along small stream one mile south of Evergreen, No. 3, 10/3/48; No. 46, 7/31/49; and No. 150, 9/19/49. Along small stream one and three-fourths miles southwest of Evergreen, No. 5157, 4/24/54.—LLOYD C. CRAWFORD, *Evergreen, Alabama.*

Recent Fern Literature

The first[1] of a series of seven special floras to cover the general flora of Belgium is the work of Dr. André Lawalrée, Assistant Curator of the Jardin Botanique de l'État, Brussels. This volume treats the pteridophytes, which include 24 genera, 54 species, 2 subspecies, 25

[1] Lawalrée, André. Flore générale de Belgique: Ptéridophytes. pp. 1–194. 46 text figures; 16 photographs. Brussels. 1950.

varieties, 16 species hybrids (of which 14 are expected, but have not yet been found), and 20 forms. With but few exceptions, notably *Selaginella helvetica, Pilularia globulifera, Salvinia natans, Polystichum setiferum,* and *Asplenium foresiacum,* all the species are represented in the United States, although some occur as different subspecies. The first fifteen pages of this work are devoted to a discussion of the characteristics of the pteridophytes, including a description of the life cycle of the male fern, *Dryopteris filix-mas;* a discussion of terminology used in the study of ferns; a brief account of the diversity of pteridophytes; and a discussion of hybridization in this group of plants. In the systematic treatment, which represents the body of the work, keys are given to all the taxa except hybrids.

This thorough study stands in contrast to many recent fern floras in its much more detailed and scientific approach. The inclusion of chromosome numbers, where these are known, and illustration of juvenile leaves of a number of species exemplifies a tendency of modern pteridology toward more searching knowledge of plants themselves and their biology. Lawalrée also represents one of the pioneers in adapting the division of the old "Polypodiaceae" into separate, more natural families to a floristic treatment. Thus he brings together genera of close alliance into separate groups following in the main the treatment of Copeland's Genera Filicum, and divides the higher ferns into the Pteridaceae, Aspidiaceae, Blechnaceae, Aspleniaceae, and Polypodiaceae (s.s.), as was recently done by Crooks for the Ferns of New Zealand[2] and Hubbard for the Ferns of Hawaii National Park.[3] In addition to the detailed descriptions, times of spore discharge, locality records in Belgium, and numerous literature references,

[2] Reviewed in this JOURNAL, **42**: 69–71. 1952.
[3] Reviewed in this JOURNAL, **43**: 127–128. 1953.

the author has accompanied each species by notes on total range, habitat, colloquial names, plant lore, and usages.

It is so customary in floristic lists to include Latin names for trivial growth forms of *Equisetum* and other lower vascular plants that we may not criticize Lawalrée for doing so. However, the argument presented, namely that designation of such forms by Latin names is for practical denomination, seems rather weak, in view of the obviously trivial nature of the growth conditions so named. The majority of such forms in Belgium and in the rest of the world are undoubtedly produced by environmental factors, and they do not represent genetical entities. A valuable contribution to the study of pteridology will be made when interests and emphases have shifted from mere naming of growth forms of *Equisetum* and other pteridophytes to the analysis of the specific factors which are responsible, a nearly untouched field.

In the generic treatment Lawalrée has adopted the name *Lastrea* rather than *Thelypteris*, following the view of Copeland. Many will question the validity of treating *Lastrea robertiana* as a variety of *L. dryopteris*.

This study may be recommended for its innovations in floristic treatment of pteridophytes, and it contains so much of value which pertains to North American plants that it would make a substantial addition to the libraries of American students of pteridology.

KENNETH A. WILSON AND W. H. WAGNER, JR.

"WHY NOT GROW FERNS" is the title of an article by one of our enthusiastic members, Dr. Benjamin R. Allison, of Hewlett, New York, and Alstead Center, New Hampshire, in the March, 1953, issue of New Hampshire Profiles. The article, after giving the background of his interest, lays down five rules for the fern gardener,

the first of which is "Find your own ferns," and the fifth "Join the American Fern Society." There should be many more fern gardeners in New Hampshire after Dr. Allison's article. We recommend that his example, in writing for his neighbors of his enjoyment of ferns, be followed by members generally.—R. C. BENEDICT.

PLANTS, MAN AND LIFE.[1]—There isn't a word about ferns in this book, so far as I have discovered, which is concerned entirely with the unravelling of the origins of common cultivated plants. However, it seems to me that its findings throw possible light on one of the most disputed of our native fern-groups—that of the *Dryopteris dilatata—intermedia—spinulosa* complex. In addition, its synthesis of Dr. Anderson's own research, together with a wide survey of the research of others, in the taxonomy, cytology, genetics, ethnobotany, and historical records of some of our commonest crop plants recommends it for its own material, as well as for its collateral value to such a non-economic pursuit as the study of ferns.

Should *dilatata* and *intermedia* be considered as distinct species coordinate with *spinulosa*, or should they be counted as "varieties" of *spinulosa*, on a par with "*fructuosa?*" I think no one disputes the point that *dilatata*, *intermedia*, and *spinulosa* by choice occupy separate habitats, and in those habitats maintain uniformity and separateness; that where in any one of such habitats any two occur together, a relatively minor proportion appear as intermediates, both in general vegetative features and in the more minute aspects of spore-markings, although these intermediates often show a tendency toward sterility. Also, there are some habitats where, today at least, intermediates may occur in considerable abundance, particularly intermediates between *intermedia* and *spin-*

[1] By Edgar Anderson. Little, Brown & Co., 1952.

ulosa. These specimens are put in a catch-all "variety," *fructuosa.* Among themselves they show a wide range of intermediate conditions between the types which some of us believe deserve to be kept as separate species.

In terms of Dr. Anderson's own research, and of his reports of the discoveries of others for a wide range of common economic plants, this *fructuosa* form in all its diversity represents the product of hybridization in many different degrees—first generation, back-crosses, with fractionization of the contributions of one or the other parent to the nth degree. Its present-day abundance in some situations may be explained again as paralleling the origin of most if not all cultivated types of plants, as related to the influence of human migrations and activities. Over the last three hundred years in this country, man has alternately encroached and retreated so far as the natural habitats of these species are concerned. Forest cover has repeatedly been cut over and then allowed to grow again. It is this human interference with nature that accounts, as Dr. Anderson analyzes it, for the mixing of various species which have unintentionally been brought into association, with subsequent crossing, in the origin of such crops as wheat, bananas, and many others of economic importance. The kind of research which has been required has been first of all a sort of detective analysis, with the application of the most modern kinds of research techniques as means of verification or refutation. For crop plants, the conclusions seem well established though many times surprising. We may hope that the relatively minor problems among ferns may be similarly susceptible of solution.—R. C. BENEDICT.

The third printing of Dr. Wherry's Guide to Eastern Ferns, announced in this Journal as having been published by the University of Pennsylvania Press, is now sold out. Copies of the second printing are still available and can be ordered from: The Academy of Natural Sciences, Philadelphia 3, Pa. The price is $2.00, but it will be appreciated if 2 cents are added for sales tax and 8 cents for postage, total $2.10.

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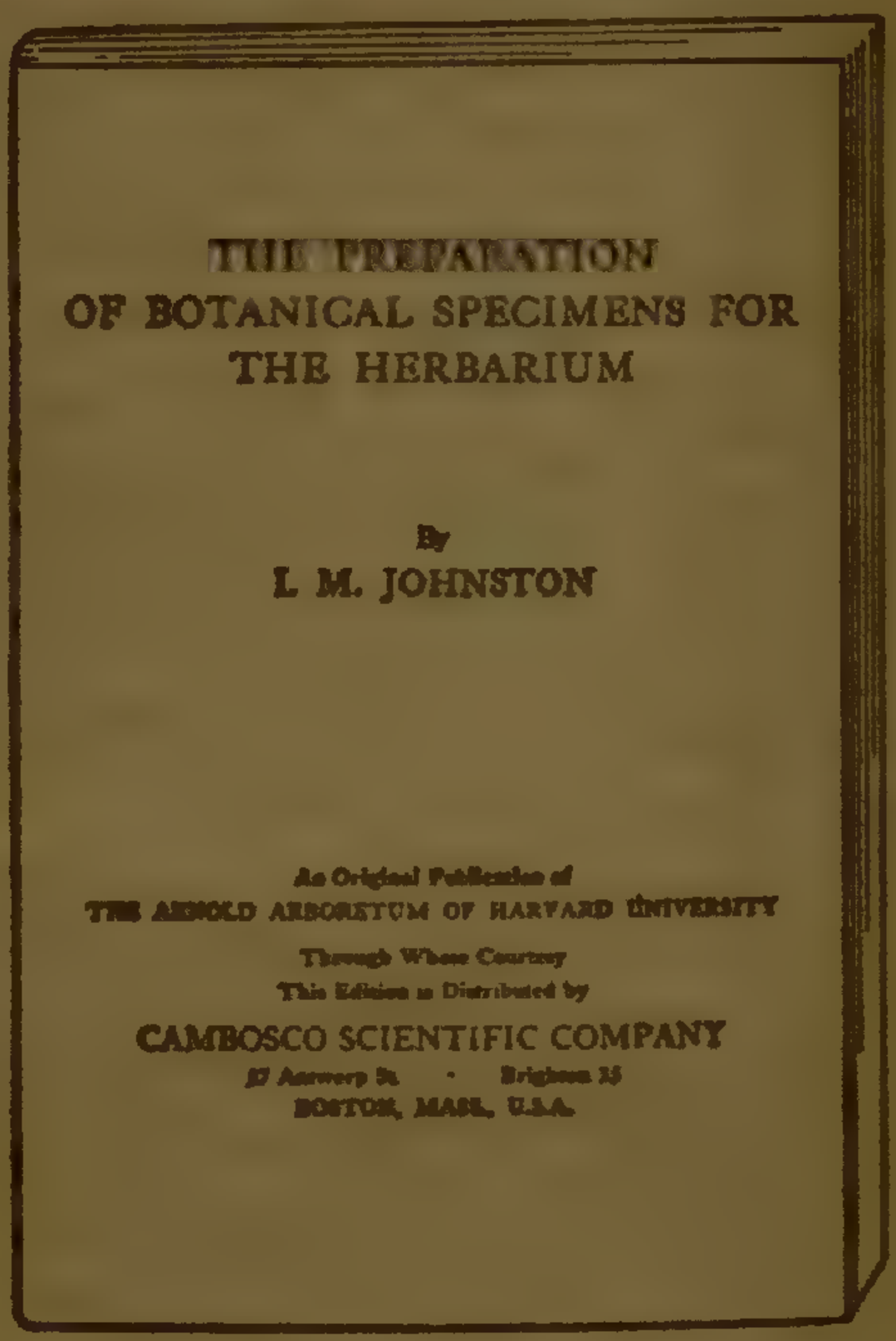

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Canan, Miss Elsie, 1023 Mencher Blvd., Johnstown, Pa. 1935
†Capp, Seth Bunker, Sub P.O. Box 2041, c/o Middle City Station P.O., Philadelphia 3, Pennsylvania 1915
Capurro, Dr. Roberto H., Charcas 1014-4, Buenos Aires, Argentina 1952
Carlson, T. O., 16 Hillcrest Road, Mountain Lakes, N. J. 1946
Carroll, Col. Robert P., Virginia Military Institute, Lexington, Virginia 1938
Cascio, Mrs. Peter J., 2600 Albany Avenue, West Hartford, Conn. 1935
Castellanos, Alberto, Canning 2904, Bajo c, Buenos Aires, Argentina 1949
Chandler, Albert, 221 W. Washington Ave., Kirkwood, Mo. 1941
Chapin, Dr. Edward A., 505 Main St., West Medway, Mass. 1953
Cheuvront, Elmer M., 239 Beaver Ave., West Aliquippa, Pa. 1948
Chillas, Richard B., Jr., 233 Winona Ave., Philadelphia 44, Pa. 1935
Chisholm, Mrs. Maude F., 232 South Orange Grove Lane, Los Angeles 36, California 1923
Cinq-Mars, Lionel, 253 Trahan, St. Jean, Prov. Quebec, Canada 1953
Clapp, Mrs. Dudley, 5 Channing St., Cambridge 38, Mass. 1953
Clark, Mrs. B. Preston, 132 Marlboro St., Boston, Mass. 1928
Clarke, Miss Gladys, 209 Lincoln Ave., Takoma Park 12, Md. 1946
Clarke, Herbert M., Biology Bldg., University of Wisconsin, Madison 6, Wis. 1948
Clausen, Dr. Robert T., Dept. of Botany, Cornell University, Ithaca, N. Y. 1934
Clevenger, Miss Sarah B., 717 South Henderson St., Bloomington, Indiana 1949
Cobb, Boughton, 180 Madison Ave., New York 16, N. Y. 1946
Constantine, Thomas S., 72 Terrace, Katonah, N. Y. 1936
Cook, E.W., First Clark National Bank, Northfork, W. Va. 1951

Cooke, Dr. William Bridge, 1135 Wilshire Ave., Cincinnati 30, Ohio 1939
Copeland, Dr. E. B., Dept. of Botany, University of California, Berkeley, California 1948
Corbet, Jack, 9537 Townley Drive, Pico, California 1952
Coronado A., Pedro S., Avenida Cuba 486, Lima, Peru 1953
Correll, Dr. Donovan S., Mt. Pisgah Road, Avenel, Silver Spring, Md. 1936
Cotton, Mrs. Edward H.,Sr., 38 Round Hill, Northampton, Mass. 1953
Crandall, Miss Dorothy L., Randolph-Macon Woman's College, Box 278, Lynchburg, Va. 1953
Crane, Mrs. Charles W., 174 Summit Ave., Summit, N. J. 1951
Crawford, Lloyd C., Route E, Box A-1, Evergreen, Alabama 1950
Croom, Neil, State University of New York, State Teachers College, New Paltz, New York 1951
Cropper, Clyde, Dept. of Vocational Agriculture, Newcastle,Ky. 1954
Daley, Miss Mary Wood, Sleighton Farm School. Parling P. O., Delaware County, Pa. 1953
Dansereau, Pierre, Dept. of Botany, University of Michigan, Ann Arbor, Michigan 1948
Darling, Cyrus, Box 79, Brattleboro, Vermont 1929
Darling, Thomas, Jr., 382 37th Place, S. E., Washington,D.C. 1952
Davies, Dr. D. A., 3124 Meadow Lark Ave., Louisville 13, Ky. 1952
Davis, Wm. A., 3471 South Kansas Ave., Milwaukee 7, Wis. 1949
Dayton, Dr. William A., Forest Service, U. S. Dept. of Agriculture, Washington 25, D. C. 1953
DeJoncheere, G. J., Phys Van Ommeren, Raboisen 40, Hamburg 1, Germany 1952
Demaree, Dr. Delzie, Bauxite, Arkansas 1938
Desmond, Hon. Thomas C., 94 Broadway, Newburgh, N. Y. 1943
DeVol, Dr. Charles E., 4208 So. Landess St., Marion, Ind. 1938
DeWolf, Gordon P., Jr., Bailey Hortorium, Cornell University, Ithaca, New York 1949
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Diroky, Robert Eugene, 1168 E. 78th St., Kansas City 5, Mo. 1952
Dix, W. L., 801 Crown St., Morrisville, Pa. 1933
Doepp, Prof. W., Hans Sachs Strasse 9, Marburg, Germany 1952
Doray, R. A., 2 Orchard St., Greenfield, Mass. 1941
Doster, Mrs. Charles S., 2924 Hastings Rd., Birmingham, Ala. 1953
Doubles, James A., Dept. of Botany, Birmingham Southern College, Birmingham 4, Alabama 1953
Douglas, Miss Gertrude E., Feura Bush, Albany County, N. Y. 1951
Dowling, Curtis F., Jr., Compania Bananera de Costa Rica, Golfito, Costa Rica 1950
Drossel, Mrs. Emma R., Star Route, Livingston Manor, N. Y. 1945
Dunbar, Henry F., Box 194, R. F. D. 3, Kingston, N. Y. 1938
Duncan, Dr. Wilbur H., Dept. of Botany, University of Georgia, Athens, Georgia 1949
Dunham, Miss Ann., Dept. of Biology, Colby College, Waterville, Maine 1953
Dunham, Mrs. F. G., 450 Beverly Road, Ridgewood, N. J. 1941
Dunlop, Prof. Douglas W., Route 1, Mukwonago, Wis. 1941
Durfee, Horton K., The Taft School, Watertown, Conn. 1952

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East, Miss Laura A., 167 Seymour St., Hartford 6, Conn. 1944
Eastwood, Sidney K., 5110 Friendship Ave., Pittsburgh 24, Pa. 1946
Edwards, James L., 27 Stanford Place, Montclair, N. J. 1932
Edwards, Robert A., Paradise, Beverly, Mass. 1954
Elliot, Rev. E. A., South Stoke Vicarage, near Reading, Berkshire, England 1939
Ellis, Erl H., P.O. Box 115, Idaho Springs, Colo. 1951
Ellis, Mrs. Mary Ellen, 3409 Newton St., Mt. Rainier, Md. 1953
Emerick, A. E., 400 Bruce St., Eaton, Ohio 1951
Emmons, Edwin T., 177 Lewis St., Geneva, N. Y. 1915
Emory, David L., 150 North Professor St., Oberlin, Ohio 1952
English, B. E., 2263 Loma Vista St., Pasadena 7, Calif. 1949
Engstron, Harold, 680 Lenox Road, Glen Ellyn, Ill. 1951
Eosefow, Michael K., 175 Meserole Ave., Brooklyn 22, N. Y. 1952
Epstein, Harold, 5 Forest Court, Larchmont, N. Y. 1952
Ericson, Mrs. John H., 22407 South Denker Ave., Torrance,Cal. 1952
Evers, Dr. Robert A., 393 Natural Resources Bldg., Urbana,Ill. 1953
Ewan, Prof. Joseph, Dept. of Botany, Tulane University, New Orleans 18, Louisiana 1930
Ewing, Mrs. Gifford C., Box 734, Rancho Santa Fe, California 1948
Eyerdam, Walter J., 7531 19th Ave., N. E., Seattle 5, Wash. 1949
Fagley, Dr. Frederick, 60 Grammercy Park, New York, N. Y. 1932
Faust, Dr. Mildred E., Syracuse University, Syracuse 10, N.Y. 1948
Feigley, Miss Margaret D., 544 Chestnut St., Winnetka, Ill. 1949
Ferril, Mrs. W. C., 2123 Downing St., Denver, Colo. 1941
Fessenden, G. Russell, 1703 Northern Parkway, Baltimore 12,Md. 1937
Finck, Nathan, 16010 Glendale Ave., Cleveland 28, Ohio 1952
Fliflet, Thorleif, 128 Kenilworth Rd., Mountain Lakes, N. J. 1947
Flo, Mrs. Spencer C., 19 James St., Greenfield, Mass. 1948
Flowers, Seville, University of Utah, Salt Lake City, Utah 1938
Foote, Mrs. E. M., Cornwall Bridge, Conn. 1925
Fosberg, Dr. F. R., 212 Holmes Run Road, Falls Church, Va. 1946
Foster, Austin T., 25 E. 86th St., Apt. 10D, New York 28, N.Y. 1951
Foster, Lincoln, Falls Village, Conn. 1950
Frank, Mrs. Irving H., 51 21st Avenue, San Francisco, Calif. 1953
Fraser, Dr. Donald A., Petawawa Forest Experiment Station, Chalk River, Ontario, Canada 1949
Frehse, Mrs. Robert M., 506 West Maplehurst, Ferndale 20,Mich. 1949
Freese, Roy E., Missouri Botanical Garden, 2315 Tower Grove Ave., St. Louis 10, Mo. 1953
Frick, Dr. T. A., Dept. of Biology, Lincoln Memorial University, Harrogate, Tenn. 1945
Gannett, L. S., 120 E. 16th St., New York, N. Y. 1928
Gaston, Mrs. John Zell, 4610 Holly St., Bellaire, Texas 1947
Giauque, Mrs. M. L. Ashley, 2643 Benvenue Avenue, Berkeley 4, California 1942
Gibson, William A., 98 Chittenden St., Columbus, Ohio 1953
Gilbert, Miss Ann C., 238 E. 31st St., Brooklyn 26, N. Y. 1953
Gilbert, Neal W., 7809 Morningside Dr.,N.W., Washington, D.C. 1940

Glasgow, Mrs. Robert D., 1013 Washington Avenue, Albany 6, N.Y. 1951
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Goodman, George J., Dept. of Plant Sciences, University of Oklahoma, Norman, Oklahoma 1949
Goodrich, Calvin, Hawk Creek Rd., Rt. 2, Asheville, N. C. 1951
Goslin, Charles R., 726 E. King St., Lancaster, Ohio 1953
Gottscho, Samuel H., 150-35 86th Ave., Jamaica 32, N. Y. 1953
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Grajek, A. C., 2928 So. 15th St., Milwaukee, Wis. 1949
Grannis, Mrs. J. K., Flemingsburg, Ky. 1940
Graves, Dr. Arthur H., 255 S. Main St., Wallingford, Conn. 1935
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Grose, E. R., Sago, West Virginia 1950
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Haas, Dr. Flora A., Box 623 Sorrento, Florida 1917
Hagenah, Dale J., 164 Westchester Way, Birmingham, Michigan 1948
Hague, Stella M., 607 S. Van Buren St., Auburn, Ind. 1949
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Hallenbeck, Esly, 14 Washington Rd., Scotia, N. Y. 1938
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Hammond, Mrs. Maynard C., Box 222, Sparrowbush, N. Y. 1953
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Harlow, Richard C., 152 W. Main St., Westminster, Md. 1940
Harrison, Mrs. Robert C., 5101 Cary St., Richmond, Va. 1953
Harvill, Prof. A. M., Jr., Firestone Plantations Company, c/o T. Ficke, Inc., 5 Dover St., New York, N. Y. 1949
Harwood, Dr. Jesse C., 337 West Walnut St., Ashland, Ohio 1948
Heath, Mrs. Victoria, 630 Highland Ave., Piedmont 11, Calif. 1952
Hegwood, Miss Muriel P., 17 Handy St., New Brunswick, N. J. 1952
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+Hires, Miss Clara S., 152 Glen Ave., Millburn, N. J. 1941
Holdridge, Carl H., c/o Ministry of Agriculture, San Jose, Costa Rica 1949
Holliger, Herbert H., Huron, Ohio 1949
Holmes, Dr. Francis O., Rockefeller Institute for Medical Research, 66th St., & York Ave., New York, N. Y. 1949
Hood, Mrs. Vance, R.D. 2, Boonton, N. J. 1951
Hoshizaki, Mrs. Barbara Joe, 565 N. Westmoreland, Los Angeles 4, California 1954
Housel, Mrs. John E., R. D. 5, Somerville, N. J. 1951
Howard, Miss Freda C., 7 St. Clair St., Ticonderoga, N. Y. 1947

Howell, John Thomas, California Academy of Sciences, Golden Gate Park, San Francisco 18, California 1952
Humfeld, Phillip H., 916 Grant St., Clay Center, Kansas 1949
†Hunnewell, Francis Welles, Washington St., Wellesley, Mass. 1915
Hunsaker, Mrs. Jerome C., 10 Louisburg Square, Boston 8, Mass. 1952
Imshaug, Henry A., Dept. of Biological Sciences, University of Idaho, Moscow, Idaho 1940
Irwin, M. G., P. O. Box 121, Apia, Western Samoa 1953
Irving, F. N., 1707 Lamont St., N. W., Washington, D. C. 1940
Jehlen, C. F., R. F. D. 2, Millbrook, New York 1936
Jennings, Dr. Otto Emery, Carnegie Museum, Pittsburgh, Pa. 1911
Johnson, Eldon H., College Highway, Southwick, Mass. 1952
Johnson, Mrs. W. Keating, Ridge Pike above City Line, Roxborough, Philadelphia 28, Pa. 1948
Johnston, Dr. James W., Jr., Georgetown University, 3900 Reservoir Road, N. W., Washington, D. C. 1952
Johnston, William S., 65 Morris Lane, Scarsdale, N. Y. 1950
Jones, Prof. G. N., University of Illinois, Urbana, Ill. 1945
Jurica, Hilary S., St. Procopius College, Lisle, Ill. 1919
Kaeiser, Dr. Margaret, Southern Illinois University, Carbondale, Ill. 1949
Kaye, Fred W., 1961 W. Verdugo Blvd., Montrose, Calif. 1941
Keller, Mrs. August, Manatauk Ave., Palisade, N. J. 1953
Kiener, Dr. Walter, Game, Forestation, and Parks Commission, State Fair Grounds, Lincoln 3, Nebr. 1949
Killip, E. P., Smithsonian Institution, Washington, D. C. 1916
Kimnach, 5313 Rosalind Ave., Richmond 9, Calif. 1953
†Kittredge, Miss Elsie M., Maple St., Bristol, Vermont 1922
Kleinschmidt, Walter F., Botanical Gardens, University of Michigan, 1404 Iroquois Drive, Ann Arbor, Michigan 1952
Knable, John P., II, 615 Amberson Ave., Pittsburgh, Pa. 1941
Knobloch, Dr. Irving W., Dept. of Biological Sciences, Michigan State College, East Lansing, Mich. 1933
Knotek, Joseph C., 2021 Superior St., Racine, Wis. 1947
Knowlton, Clarence H., 24 Elm St., Hingham, Mass. 1911
Knox, Mrs. Wm. C., 649 Isle of Palms, Ft. Lauderdale, Fla. 1951
Koeniger, Mrs. Florence, 6 Walsh Lane, Fairfax, California 1945
Koster, Hollis, 122 North 19th St., Philadelphia, Pa. 1940
Kozloff, Prof. Eugene N., Dept. of Zoology, University of North Carolina, Chapel Hill, N. C. 1948
Kramer, Irvin A., 231 Acton St., Daly City 25, Calif. 1953
Kunneke, J. W., 2307 Village Dr., Louisville, Ky. 1948
Kucyniak, James, Montreal Botanical Garden, 4101 East Sherbrooke St., Montreal, Canada 1953
Lakela, Prof. Olga, Dept. of Botany, University of Minnesota, Duluth Branch, Duluth 5, Minn. 1952
Lamoreaux, Frank, 209 Clifford St., Newark 5, N. J. 1953
Lampton, Robert K., 22 Edgehill Dr., Lancaster, Pa. 1953
Lawton, Dr. Elva, Hunter College, 695 Park Ave., New York, N.Y. 1926
Learned, Mrs. W. S., 404 Riverside Dr., New York 25, N. Y. 1953
Lee, E. V., 73B Collingwood St., San Francisco 14, Calif. 1949
Lee, Frederic P., 7401 Glenbrook Rd., Bethesda 14, Md. 1954
LeGrand, Miss Mona Rose, Labadieville, Louisiana 1953

Lehr, J. Harry, R. F. D., Monsey, New York 1953
Leonard, E. C., Smithsonian Institution, Washington 25, D. C. 1920
Liggett, W. F., 700 Swarthmore Lane, University City, Mo. 1940
Lippincott, Dr. Rebecca C., 122 W. Main St., Moorestown, N. J. 1931
Lippincott, Miss Ruth, 56 La Cuesta Dr., Orinda, Calif. 1953
Litch, C. M., 7 Pearl St., Fitchburg, Mass. 1916
Litchfield, Mrs. Norman, Barry Rd., Quaker Farms, R. D. 2, Southbury, Conn. 1949
Little, Elbert L., Jr., Forest Service, U. S. Dept. of Agriculture, Washington 25, D. C. 1946
Lockard, Vene T., 15 South 10th St., Gladstone, Mich. 1948
Locke, John F., Box 1568, State College, Miss. 1949
Loeffler, Robert J., 83 New Bond St., Worcester, Mass. 1947
Logan, Harry, Whitney St., Westport, Conn. 1953
†Logue, Dr. Everett G., First National Bank Building, Williamsport, Pa. 1920
Lommasson, Dr. Robert C., Dept. of Botany, University of Nebraska, Lincoln 8, Nebr. 1949
Long, Bayard, 250 Ashbourne Road, Elkins Park, Philadelphia, 17, Pa. 1911
Looser, Gualterio, Casilla 5542,Santiago 6, Chile 1928
Lord, Arthur R., Route 1, Box 113, Palos Park, Ill. 1952
Lord, Mrs. Marie L., 101 Clay St., Burlington, Iowa 1940
Loughbridge, Gasper, Dept. of Biology, Davis and Elkins College, Elkins, West Virginia 1949
†Lowe, Mrs. Frank E., Box 65, Harrison, Me. 1917
Lownes, Albert E., P. O. Box 1531, Providence, R. I. 1924
Luhr, Mrs. Arthur, 555 Kellogg Ave., Palo Alto, California 1941
Lukens, William W., Jr., Upper Gulph Rd., Radnor, Pa. 1949
Lundell, C. L., Texas Research Foundation, Renner, Texas 1952
Lynch, David, 3679 Highwood Dr., S. E., Washington 20, D. C. 1952
Lyonnet, Prof. Pierre, Colegio Cristobal Colon, Sadi Carnot 38, Mexico D. F., Mexico 1948
MacCrindle, Mrs. Victoria, 344 Bridgeboro Rd., Riverside,N.J. 1952
MacFadden, Mrs. Fay A., 5450 Carlin St., Los Angeles 16, Cal. 1953
Mann, William H., Sr., R.D.1, Queensbury Ave.,Glens Falls,N.Y. 1952
Mansfield, Dr. William, 371 Kenwood Ave., Delmar, N. Y. 1922
Manter, Dr. Marion E., 104 E. 40th St., New York 16, N. Y. 1952
†Marble, John E., 1313 Garfield Ave., South Pasadena, Calif. 1928
Mark, Miss Clara G., 270 So. State St., Westerville, Ohio 1913
Marsh, Mrs. Spencer S., Midwood Terrace, Madison, N. J. 1927
Marshall, Dr. Frank A., 2202 Palisade Ave., Weehawken, N. J. 1953
Masek, John, Apopka, Florida 1935
Massey, Prof. A. B., Virginia Polytechnic Institute, Blacksburg, Virginia 1935
Matthews, Mrs. Orville, Hot Springs, Virginia 1953
Matthews, Miss Velma D., Coker College, Hartsville, S. C. 1940
McAvoy, Miss Blanche, 108 W. Ash St., Normal, Illinois 1920
McCauley, Dr. Robert H., Jr., Technical Development Laboratory, Box 769, Savannah, Georgia 1941
McCoy, Thomas N., Todd County High School, Elkton, Ky 1934
McDowell, Gladstone W., 328 Heard St., Elberton, Georgia 1947

McEachran, Hugh M.A., R. R. 1, Ste. Therese de Blainville, Co. Terrebonne, Quebec, Canada 1948
McGilliard, Miss Eleanor, Dept. of Biology, University of Chattanooga, Chattanooga, Tenn. 1935
McGregor, Dr. Ronald L., Dept. of Botany, University of Kansas, Lawrence, Kansas 1946
McIlvane, Dr. Harold, Box 155, University Station, Moscow, Ida. 1949
McLean, Robert, The Evening and Sunday Bulletin, Philadelphia 6, Pa. 1954
Merrell, Miss Elinor, 40 E. 57th St., New York 22, N. Y. 1952
Miller, Miss Isabelle, 23 Edmondson Ridge Rd., Catonsville, 28, Md. 1953
Millspaugh, Robert, 854 Humboldt St., Brooklyn 22, N. Y. 1952
Milne, Dr. D. M., Bank Commerce Bldg., Portland 3, Me. 1947
Mitchell, James E., Route 3, Barre, Vermont 1952
Mockford, Mrs. Joseph J., Itasca State Park, Arago, Minn. 1953
Moon, Mrs. Charles, 105 W. Woodbine St., Chevy Chase 15, Md. 1952
Moore, Prof. Dwight M., Dept. of Botany, University of Arkansas, Fayetteville, Ark. 1935
Moore, Dr. George T., Missouri Botanical Garden, St. Louis 10, Mo. 1915
Moore, Miss Jewel, Box 56, Arkansas State Teachers College, Normal Station, Conway, Ark. 1947
Moore, Dr. John W., Dept. of Botany, University of Minnesota, Minneapolis 14, Minn. 1946
Morgan, Rev. A. Rufus, Box 319, Franklin, N. Car. 1949
Morgan, Dr. D. P., 340 E. 72nd St., New York, N. Y. 1954
Morgan, Mrs. Weld, 54 West St., Worcester, Mass. 1943
Morton, C. V., Smithsonian Institution, Washington 25, D. C. 1940
Moul, Dr. Edwin T., Dept. of Botany, Rutgers University, New Brunswick, N. J. 1945
Mountain, Worrall F., Jr., Mt. Kemble Ave., Morristown, N.J. 1953
Muenscher, W. C., Dept. of Botany, Cornell University, Ithaca, New York 1949
Murray, Miss Mary Aileen, Dept. of Biology, DePaul University, 1036 Belden Ave., Chicago 14, Ill. 1949
Mutchler, Miss Marjorie, 71 W. 8th St., Bayonne, N. J. 1942
Myers, Dr. R. M., Western Ill. State College, Macomb, Ill. 1947
Nagel, Miss Laura, 676 Mayfield Ave., Stanford, Calif. 1953
Naylor, Richard M., 2835 Fish St., Denver 7, Colo. 1952
Neeman, James, P.O. Box 73, Garberville, Calif. 1947
Neidorf, Charles, 910 Sheridan Ave., New York 51, N. Y. 1937
Newell, Chauncey Jackson, Alstead, New Hampshire 1902
Nicewonger, C. R., 80 Codornices Rd., Berkeley, Calif. 1953
Nishida, Makoto, Biological Institute, Chiba University, Konakadai, Chiba, Japan 1953
Norcross, Arthur D., 244 Madison Ave., New York 16, N. Y. 1952
Norton, Leroy F., Box 123, Presque Isle, Me. 1941
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Ownbey, Dr. Gerald B., Dept. of Botany, University of Minnesota, Minneapolis 14, Minn. 1951
Palmer, Ernest J., 321 So. Main St.. Webb City, Mo. 1909
Palmer, Dr. T. H., 1939 Biltmore St., N. W., Washington, D.C. 1911
Parker, Mrs. Robert S.(Muriel Schulte), 13 Woodland Road, Short Hills, N. J. 1946
Patnode, John S., 24 Clinton Ave., Pittsfield, Mass. 1945
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Peterson, Miss Ethel, 36 Ridge Rd., Cos Cob, Conn. 1952
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Phelps, Dr. Orra A., Gansevoort, N. Y. 1952
Phillips, Walter S., Dept. of Botany, University of Arizona, Tucson, Ariz. 1945
Pichi-Sermolli, Dr. Rodolfo, Istituto Botanico, Universita di Firenze, 4 via Lamarmora, Firenze, Italy 1941
Pickard, A. C., 1702 North Blvd., Houston 6, Texas 1953
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DePonce, Mrs. Amelia Mesa, Calle Juan Delgardo 455, Vibora, Habana, Cuba 1950
Pond, Bremer W., Pittsburg, N. H. 1910
Poole, Dr. James P., Dept. of Biology, Dartmouth College, Hanover, N. H. 1940
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Proctor, George R., Science Museum, The Institute of Jamaica, Kingston, Jamaica, B. W. I 1938
Prosser, Capt. Albert L., Box H, Springvale, Me. 1953
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Risley, Mrs. Thomas E., 1044 North Van Ness Ave., Fresno, Cal. 1951
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Rogers, Mrs. Charles R., 20 Haslet Ave., Princeton, N. J. 1941
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Sanchez, Jose, Colegio Ignacio Zaragoza, Hidalgo Sur 405, Saltillo, Coahuila, Mexico 1945
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Scarborough, Henry H., Jr., Dept. of Botany, University of Massachusetts, Amherst, Mass. 1951
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Schechter, Victor, City College of New York, Convent Avenue and 138th St., New York 31, N. Y. 1952
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Schmidt, Miss Claudia. 39 Ely Ave., W. Springfield. Mass. 1937
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Schreiter, Seymour, 1540 E. Genesee St., Syracuse 10, N. Y. 1950
Schuurman, J. A., c/o High Commissioner of the Netherlands, Gumbir Timor N3, Djakarta, Indonesia 1934
Schott, Samuel, 140 So. Hamilton Ave., Greensburg, Pa. 1950
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Sharp, Prof. A. J., Dept. of Botany, University of Tennessee, Knoxville 16, Tenn. 1940
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Sherman, Dr. Hope, Pleasant Valley, Conn. 1951
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Shuck, Dr. Arthur L., Dept. of Biology, Southwestern State College, Weatherford, Okla. 1950
Sidney, Cedric, 111 Rosewood Dr., Hammond, Louisiana 1941
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Simon, Mrs. Stanley D., 1030 Elm Park Dr., Cincinnati 16, Ohio 1951
Singeltary, Mary L., Kissimmee, Fla. 1934
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Smith, Dr. A. C., Smithsonian Institution, Washington 25, D.C. 1931
Smith, Dr. A. V., Dept. of Botany, Catholic University of America, Washington 17, D. C. 1939
Smith, Mrs. Frank C., Jr., 369 May St., Worcester, Mass. 1931
Smith, Jesse F., 347 Main St., Suffield, Conn. 1949
Smith, Miss Laura Mercado, 160 Marina Vista, Larkspur, Calif. 1954
Smith, Miss Marion L., 429 South Willard St., Burlington, Vt. 1953
Smith, Miss Ora E., 821 Bergen Ave., Jersey City, N. J. 1939
Smith, Dr. Stanley J., New York State Museum, Albany, N. Y. 1952
Snyder, Franklin L., 303 E. Tugalo St., Toccoa, Ga. 1953
Sobol, Miss Eva, 1080 Anderson Ave., Bronx 52, N. Y. 1953

Somerville, Mrs. Mary F., 978 Lincoln Way, East, Chambersburg, Pa. 1923
Soper, Prof. James H., Dept. of Botany, University of Toronto, Toronto 5, Canada 1952
Stabler, Edward C., Dunster K 11, Harvard University, Cambridge 38, Mass. 1950
Standley, Paul C., Escuela Agricola Panamericana, Apartado 93, Tegucigalpa, Hond. 1915
Stauffer, R. Eliot, Kodak Park Works B 59-2, Room 561A, Eastman Kodak C., Rochester 4, N. Y. 1952
†Steil, Dr. William N., 1926 No. 53rd St., Milwaukee, Wis. 1916
Sterling, Mrs. Dorothy, Kirby Lane North, Rye, N. Y. 1953
Stevens, Mrs. Leslie B., 95 Grove St., Plantsville, Conn. 1949
Steward, Orville M., P.O.Box 19, Fordham Branch, New York 58, N. Y. 1951
Steyermark, Dr. Julian A., Chicago Natural History Museum, Chicago 5, Ill. 1948
Stifler, Mrs. James M., 315 16th St., Bradenton, Fla. 1935
†Stockman, Charles C., II, 153 High St., Newburyport, Mass. 1946
Stokes, Mrs. Francis J., The Mill, Darlington, Md. 1940
Stokey, Prof. Alma G., Dept. of Plant Sciences, Mt. Holyoke College, South Hadley, Mass. 1949
Stone, Miss Edna L., 3216 44th St., Washington 16, D. C. 1928
Stone, Orra L., 22 Pearl St., Clinton, Mass. 1951
Storer, Robert W., Museum of Zoology, University of Michigan, Ann Arbor, Mich. 1944
Storey, Oliver W., 924 Golf Lane, Wheaton, Ill. 1934
Stoudt, Harry N., Dept. of Biology, Temple University, Philadelphia 22, Pa. 1949
Stratton, Mrs. G. W., Inwood, Buck Hill Falls, Pa. 1916
Sumner, Maurice H., 350 Edgehill Way, San Francisco, Calif. 1953
Svenson, Dr. Henry K., American Museum of Natural History, New York 24, N. Y. 1931
Swendsen, Mrs. Lucille Evans, 2129 E. Kenwood Blvd., Milwaukee 11, Wis. 1936
Tanger, Mrs. Charles Y., 318 No. President Ave., Lancaster, Pa. 1930
Taylor, Dr. Aravilla M., 73 Delaware Ave., Delhi, N. Y. 1923
Taylor, Fran, 220 Pierce Ave., Lancaster, Ohio 1952
Taylor, Prof. T. M. C., University of British Columbia, Vancouver, Canada 1932
Teresita, Sister M., Holy Family Convent, R.D.F. 1, Manitowoc, Wis. 1944
Terrell, Mrs. EdwardE., 616 N. South St., Wilmington, Ohio 1951
Thacher, S. Charles, 2918 Brownsboro Rd., Louisville 6, Ky. 1953
Thorne, Frederick, Pilot Knob, New York 1953
Thurston, Edward D., Jr., Sharon, Conn. 1937
Thurston, Mrs. Edward D., Jr., Sharon, Conn. 1940
Tierney, Mrs. George, 593 Buchanan St., Hillside 5, N. J. 1953
Tilley, Trenor P., 1356 Northampton St., Holyoke, Mass. 1921
Timpson, Miss Margaret, Longwood Crossing, Cedurhurst, Long Island, N. Y. 1952
Tindale, Miss M., Botanic Gardens, Sydney, Australia 1951
Trudell, Harry W., 1309 Highland Ave., Abington, Pa. 1919

Truesdell, Horace, Bluemont, Va. 1948
Tryon, Mrs. Alice F., Missouri Botanical Garden, St. Louis,Mo. 1947
Tryon, Dr. Rolla M., Jr., Missouri Botanical Garden, St. Louis, Mo. 1932
Turner, Mrs. H. M., 88 Barnett St., New Haven, Conn. 1930
Valentine, Mrs. Elizabeth A., 3943 Locust St., Philadelphia 4, Pa. 1946
Van de Water, Dr. C. M., 82 Essex Rd., Summit, N. J. 1947
Van de Water, Mrs. Elinore S., 264 Hillside Ave., Chatham,N.J. 1947
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Velasco C., Dr. Julio, 3420 Vendome Ave., Montreal, Canada 1952
Vincent, Mrs. Myron H., Chilmark, Mass. 1917
Vogler, Anton E., 209 State St., Russell, Pa. 1952
Voth, Dr. Paul D., Dept. of Botany, University of Chicago, Chicago 37, Ill. 1942
Wagner, Warren H., Jr., Dept. of Botany, University of Michigan, Ann Arbor, Mich. 1940
Walker, Dr. Stanley, The Hartley Botanical Laboratories, The University, Liverpool 3, England 1954
*Waters, Dr. Campbell E., 5812 Chevy Chase Parkway, Washington 15, D. C. 1893
Weatherby, Mrs. Charles A., 27 Raymond St., Cambridge 40, Mass. 1914
Wertmann, Mrs. Frieda L., 10613 Brunswick Ave., Kensington, Md. 1953
West, Dr. Erdman, Florida Agricultural Experiment Station, University of Florida, Gainesville, Fla. 1942
West, George A., Chosen, Florida 1952
Wherry, Prof. Edgar T., University of Pennsylvania, Philadelphia, Pa. 1918
Whitehead, John W., 424 W. 69th St., Los Angeles 3, Calif. 1936
Whitehouse, Eula, Box 739, Southern Methodist University, Dallas 5, Texas 1949
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Wiggins, Dr. Ira L., Dudley Herbarium, Stanford University, Stanford, Calif. 1932
Wiley, Miss Farida A., Museum of Natural History, New York 24, N. Y. 1927
Wilkens, Hans, 424 So. 15th St., Reading, Pa. 1927
Williams, L. Terry, P.O.Box 605, Many, Louisiana 1952
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Wilson, Kenneth A., Dept. of Botany, University of Michigan, Ann Arbor, Michigan 1953
Wilson, Mrs. N. B., 943 Greenwood Ave., N. E., Atlanta 6, Georgia 1954
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Winne, Dr. William T., 2517 Troy Rd., Schenectady, N. Y. 1950
Witschen, Mrs. William J., 217 W. 6th Ave.. Roselle, N. J. 1951
Wright, Mrs. C.H.C., 9 Lowell St., Cambridge, Mass. 1935
Wright, Miss Mary F., 231 Winona St., Philadelphia 44, Pa. 1925
Young, John P., Renwick Drive, Ithaca, N. Y. 1920

Zelley, Miss Grace S., 960 Columbus Road, Burlington, New Jersey 1942

Ziegler, A. W., Department of Botany, Florida State University, Tallahassee, Florida 1950

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C. V. MORTON

R. C. BENEDICT IRA L. WIGGINS

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American Fern Journal

VOL. 45 JANUARY–MARCH, 1955 NO. 1

New Records for Georgia Ferns

WILBUR H. DUNCAN

During the last 14 years I have made intensive efforts to obtain herbarium material and to accumulate other data necessary for the preparation of a "Flora of Georgia." Collections have been made of all groups of vascular plants, including ferns. Most of the fern data obtained prior to 1951 are included in McVaugh and Pyron's "Ferns of Georgia."[1] Since then a considerable amount of distributional data has been obtained for ferns and a few earlier collections have been encountered in going through some older, miscellaneous, unnamed material. It seems appropriate to make this accumulated information on ferns available to others. No ferns new to the state are to be reported but second records, occurrence of species in new physiographic provinces, considerable extension in ranges, and additional county records are presented. All stations are represented by specimens in the University of Georgia Herbarium unless otherwise indicated. Reference to each specific collection may be had through the collector and collection number.

One of the ferns which has been known from only one locality in Georgia is *Trichomanes petersii*, which is reported from the gorge below Tallulah Falls in the northwestern part of the state in the Blue Ridge Province. I have spent several days without success trying to relo-

[1] 1951. 195 pp. University of Georgia Press, Athens, Georgia. [Volume 44, No. 4, of the JOURNAL, pp. 129–168, was issued December 13, 1954.]

cate this colony and have kept a lookout for this species in appropriate places elsewhere. On 4 July, 1952, two graduate students, James W. Hardin and William F. Humphrey, and I were botanizing in Walker County, 9.5 miles southwest of Lafayette in Gayton Gulf (Canyon), which is in the Cumberland Plateau. There growing in profusion on huge limestone rocks was this fern in excellent fruiting condition. A loud "*Trichomanes!*" expressed my thrill in finding this species 51 years after A. B. Seymour collected it at Tallulah Falls. The collection is *Duncan* 13849, *Hardin, and Humphrey*. We looked carefully for *T. boschianum* in this and other canyons, with no success.

Polypodium polypodioides may be seen frequently throughout most of the state and so I have made few collections of it. Visual records for several counties (Emanuel, Echols, Clinch, Jefferson, Screven, Talbot, Ware) augment previous distributional data, especially in the Coastal Plain.

On a rocky plateau in Bartow County, in the Ridge and Valley Province, there are a number of natural ponds around and in which are several vascular plants whose distribution is generally in the Coastal Plain. Among these is *Pteridium aquilinum* var. *pseudocaudatum*, which grows in a flat, open, deciduous woods at the southeast corner of Quicksand Pond at 930 feet elevation (*Duncan* 12880). Collections from Berrien (*Duncan* 11831) and Columbia (*Duncan* 9531) Counties are also to be added to the distributional record for the species. Visual records for the species, which is important as a poisonous plant in this state of extensive natural pastures, are: Ben Hill, Columbia, Crawford, Echols, Houston, Irwin, Muscogee, Quitman, Talbot, Telfair, Wheeler, and Wilcox Counties.

At the margins of many of the natural ponds described above and others in Walker and Dade Counties

there are dense colonies of *Anchistea virginica*, which was previously reported to occur in Georgia only rarely north into the lower Piedmont Province. The stations reported below are exciting extensions of range into two new provinces and to an elevation of 2,000 feet.

Ridge and Valley Province—BARTOW: *Duncan* 12308, Quicksand Pond, 930′; *Duncan* 12775, Green Pond, 990′; *Duncan* 12946, South Cat Pond, 930′. WALKER: *Duncan* 12642, Brushy Pond, 970′.

Cumberland Plateau—WALKER: *Duncan* 15956 *and Hardin*, ¾ mile NNW of Steven Gap, 2,000′. DADE: *Duncan* 15939 *and Hardin*, one mile W of Durham, 1920′.

Other collections for this fern include: WILCOX: *Duncan* 14236 *and Hardin*. WORTH: *W. F. Humphrey* 30. Observed localities are in Bacon, Ben Hill, Bleckley, Brooks, Bulloch, Clinch, Coffee, Irwin, Jefferson, Johnson, Pierce, Telfair, Turner, Wayne, and Wheeler Counties.

In July, 1953, Mr. Ashton Varnedoe, a science teacher at Savannah, Georgia, discovered a colony of *Adiantum pedatum* on steep, wooded slopes overlooking the Savannah River at Porter's Landing in Effingham County. This station is only 44 miles from the Atlantic Ocean and constitutes a surprising extension to the southeast in the range for this species. It is also only the third record from the Coastal Plain Province. I have the species from Lincoln County (*Duncan* 10307), which is also from steep wooded slopes overlooking the Savannah River, and from Madison County (*Duncan* 11719), from steep, wooded slopes overlooking Broad River.

Some additional records for members of the genus *Cheilanthes* are:—the rather rare *C. tomentosa*, MADISON: *Duncan* 11621;—the more common *C. lanosa*, MERIWETHER: *Duncan*, 10724b; —the restricted *C. alabamensis*, GORDON: *Duncan* 12808 and 13193, which col-

lections are from the third county known in Georgia and extend the range about 40 miles southeastward.

Lorinseria areolata, which is not abundant outside the Coastal Plain, has been found around two natural ponds in Walker County (*Duncan* 12486, Brushy Pond, 4.2 miles northeast of Lafayette, 970′, and *Duncan* 15942, ¾ miles NNW of Steven Gap, 2,000′). This latter station extends the range into the Cumberland Plateau. Other collections are FANNIN: *Duncan* 7329. EFFINGHAM: *Duncan* 15144 *and Hardin.* PIKE: *Duncan* 6286b. This fern also has been observed in Echols, Hancock, Harris, Long, Quitman, and Wilcox Counties.

Murray (*Duncan* 15771 *and M. B. Duncan*), Fannin (*Duncan* 7337), and Forsyth (*Duncan* 5263) Counties are to be added to the distribution of *Asplenium trichomanes,* and Wilcox (*Duncan* 16118 *and Hardin*), Irwin (*Duncan* 16192 *and Hardin*), and Dawson (*Duncan* 7206) Counties for *A. platyneuron.* The latter species has also been observed in Pike, Pulaski, and Quitman Counties.

In 1951 G. W. McDowell and I were botanizing the steep north-facing slopes of the water gap through Taylor Ridge, a well known Civil War battle site, just southeast of Ringgold in Catoosa County. Among the many interesting plants we found was a colony of *Camptosorus rhizophyllus* (*Duncan* 12227 *and McDowell*), which is one of the less common ferns of Georgia and which had not been previously reported from Catoosa County.

Two Savannah, Georgia, science teachers, Mr. Ashton Varnedoe and Mrs. Earl Ellis, and I noticed an interesting broadleaf evergreen-deciduous woods in a low area 4.4 miles WSW of Savannah. We stopped and examined the woods, finding several species of ferns. *Lorinseria areolata,* which was in large dense colonies, was easy to recognize before we entered the woods. Once in

the woods we came across smaller colonies of *Athyrium filix-femina*, *Dryopteris ludoviciana*, and *Polystichum acrostichoides*. Upon checking in "Ferns of Georgia" we learned that these species had not been reported previously from Chatham County and that our find was nearest the Atlantic in Georgia for all three of these species. Previously I had collected *Athyrium filix-femina* from several new counties, the complete list being: CHATHAM: *Duncan* 17270; APPLING: *Duncan* 13695 *and Hardin;* WALKER: *Duncan* 15959 *and Hardin;* HABERSHAM: *Duncan* 11175; TALIAFERRO: *Duncan* 11399; COLUMBIA: *Duncan* 9520; PIKE: *Duncan* 6287. New collections for *Dryopteris ludoviciana* are: CHATHAM: *Duncan* 17272; BULLOCH: *Duncan* 14693. For *Polystichum acrostichoides* new collections are: CHATHAM: *Duncan* 17276; EFFINGHAM: *Duncan* 15136 *and Hardin.*

In May, 1953, James Hardin and I were exploring an exceptionally cool, wooded ravine at about 1950 feet elevation in White County in the Blue Ridge Province. After I was nearly bitten by a copperhead snake, it was some time before strength and courage returned sufficiently for me to get back to botanizing. We were well rewarded, however, for we found *Athyrium thelypteroides* (*Duncan* 16366 *and Hardin*), the fifth station in the state, and *A. pycnocarpum* (*Duncan* 16363 *and Hardin*) for the second record and a new province for the species in Georgia. Previously this latter species was known only from the Ridge and Valley.

Dryopteris hexagonoptera is shown in "Ferns of Georgia" to extend down the eastern edge of the state only to Hart County. The known distribution is extended considerably to the southeast by a collection from Lincoln County (*Duncan* 10302). It was also collected from Habersham County (*Duncan* 11168). A collection of *D. noveboracensis* (*Duncan* 6582) from Pike County adds a record to the scattered localities near the southern

limits for this species. Stephens County is to be listed as a new record for *D. marginalis* (*Duncan* 6453).

Mr. Hardin and I, in April, 1953, botanized a steep, calcareous bluff and ravines on the south side of the Coosa River near Rome in the Ridge and Valley Province. *Erigenia bulbosa, Euonymus atropurpureus, Phacelia bipinnatifida,* and many other species not commonly occurring in Georgia have been found there. On this visit we located *Cystopteris bulbifera* (*Duncan* 15246 *and Hardin*), which I had not seen on a number of previous visits. This is partly due to the rugged nature of this habitat. A check in "Ferns of Georgia" revealed that the only previous record for this fern in the state was over 50 miles to the north and in a different province, the Cumberland Plateau.

Another interesting extension of range is that of *Cystopteris fragilis* south to Fulton County, in the Piedmont Province, where it grows in rock crevices of wooded cliffs on the south side of the Chattahoochee River east of Marsh Creek (*Duncan* 9698 *and McDowell*). This is 60 miles south of previously reported stations, which are either in the Blue Ridge or Ridge and Valley Provinces.

Additional records for *Woodsia obtusa* are: STEPHENS: *Duncan* 6442; LINCOLN: *Duncan* 10326. New records for *Onoclea sensibilis* are: WHITE: *Duncan* 16351 *and Hardin;* BRYAN: *Duncan* 17368.

A new province, the Cumberland Plateau, may be added to the distribution of *Osmunda regalis* in Georgia on the basis of a collection from Walker County (*Duncan* 15942 *and Hardin*), at an altitude of about 2000 feet. This species is also reported here for the first time from McIntosh (*Duncan* 17795) and Hart (*Duncan* 4870) Counties. I have seen it in Ben Hill, Bulloch, Coffee, Dodge, Lumpkin, Quitman, Talbot, White, and Wilcox Counties, which were previously unreported for

the species. *Osmunda cinnamomea* is reported also from McIntosh County (*Duncan* 17669), and from Wayne (*Duncan* 1997) and Montgomery (*Duncan* 4728) Counties. It has been observed in a number of counties previously unreported for the species, namely, Bulloch, Echols, Glascock, Harris, Houston, Long, Quitman, Screven, and Talbot.

Osmunda claytoniana, which previously was reported for only three counties in Georgia, was collected in May, 1953, from Union (*Duncan* 16343 *and Hardin*) and Lumpkin (*Duncan* 16403 *and Hardin*) Counties.

A collection of *Botrychium dissectum* var. *tenuifolium* (*Duncan* 6580) from Pike County is to be added to the record for this common variety. The range of the rarer *B. dissectum* var. *obliquum* is extended 90 miles southward by a collection (*Duncan* 14221 *and Hardin*) from a hardwood community on steep slopes on the south side of Indian Creek 7 miles ESE of Perry, in Houston County. This is apparently the first record for this variety from the Coastal Plain of Georgia. Additional records for the more common *B. virginianum* are: JASPER: *Duncan* 9167 *and S. J. Smith;* ELBERT: *Duncan* 9404; PUTNAM: *Duncan* 7924; MORGAN: *Duncan* 10828a. These records partially fill in the scattered distribution pattern shown in "Ferns of Georgia."

No species of *Equisetum* is common in Georgia, according to the records reported to date. It was an unusual occasion, therefore, to find *E. praealtum* on the sandy banks of Mill Creek in Whitfield County (*Duncan* 15997 *and Hardin*).

Lycopodium adpressum is nowhere abundant in Georgia, and "Ferns of Georgia" shows no record for this species in most of the Coastal Plain. Some new collections are from this large vacant section, one collection being the first record for a coastal county. The collections are: CHATHAM: *Duncan* 17357: EMANUEL:

Duncan 9911. New records from the Coastal Plain for the more common *L. alopecuroides* are: WILCOX: *Duncan* 14262 *and Hardin;* WHEELER: *Duncan* 14755 *and Hardin;* BRANTLEY: *Duncan* 17037, *R. M. Harper, and Humphrey.*

A number of the new Coastal Plain stations for *L. prostratum* fill in some of the blanks in the scattered distribution shown in "Ferns of Georgia." Two of the collections were made on a trip with Dr. Roland M. Harper, who gave the species its present name. The records are: BRANTLEY: *Duncan* 17030, *Harper, and Humphrey;* WHEELER: *Duncan* 16951, *Harper, and Humphrey;* IRWIN: *Duncan* 16185 *and Hardin;* TIFT: *Duncan* 13652 *and Hardin;* WAYNE: *Duncan* 9708.

Of the *Lycopodium* species occurring in Georgia, *L. carolinianum* is the least conspicuous and is probably more abundant relatively than the records would indicate. During field trips of the last two years I have looked carefully for this species in suitable habitats and have made collections of it from five new Coastal Plain counties which are in some large sections previously devoid of records. The collections are: BULLOCH: *Duncan* 15184 *and Hardin;* CAMDEN: *Duncan* 16598; WHEELER: *Duncan* 16950, *Harper, and Humphrey;* BRANTLEY: *Duncan* 17035, *Harper, and Humphrey;* BERRIEN: *Duncan* 17066, *Harper, and Humphrey.*

Only three stations in Georgia are reported for *L. complanatum,* which is apparently quite uncommon in the state. Mrs. L. H. Wall of Elberton, Georgia, who has an intense interest in nature, sent to me specimens of this species which she found in May, 1954, in Elbert County, the fourth locality to be reported for the state.

Only three records for *L. cernuum* are given in "Ferns of Georgia" and a fourth was recently added by Dr. Elsie Quarterman. I had never seen this uncommon species growing until August, 1953, when a colony was

discovered in Colquitt County (*Duncan* 17110, *Harper, and Humphrey*) for the fifth record for the state. The habitat was typical for the species in Georgia, moist banks of a large roadside ditch and an adjacent borrow pit at the edge of a scrub oak-pine sandhill.

Selaginella apoda is not a conspicuous species, but since it grows in moist situations it is reasonably easy to locate with little searching by those who visit appropriate habitats. Eight new stations scattered in the northern half of the state are: COLUMBIA: *Duncan* 9526; MUSCOGEE: *Duncan* 9664; CARROLL: *Duncan* 10802; HABERSHAM: *Duncan* 11165; OGLETHORPE: *Duncan* 11646; WALKER: *Duncan* 13834b, *Hardin, and Humphrey;* MERIWETHER: *Duncan* 16790, *Harper, H. Venard, and Humphrey;* BIBB: *Bruce Flanders* 440.

One of the interesting plants of the granite outcrops is *Isoëtes melanopoda,* which grows there in the permanent to temporary pools of water. The limited distribution which is reported, therefore, is easily understood. As I was writing the present paper, Mr. G. W. McDowell, of Elberton, Georgia, presented to the University of Georgia Herbarium a specimen of this species which he collected on 6 May, 1954, from a granite outcrop 2.5 miles S15°E of Elberton. This is a new county and a short extension in range for this species.

Mr. McDowell had earlier collected *Isoëtes engelmanni* var. *caroliniana* from a sluggish stream in a woods in Jasper County. A specimen is in the herbarium of the Georgia Botanical Society, Atlanta, Georgia. In addition to this new record there are for the same variety the following: PUTNAM: *Duncan* 7916; RABUN: *Duncan* 10101. Both of these collections were also from sluggish streams in woods, the latter being from an elevation of about 2750 feet.

My collections reported here were obtained mostly incidental to a number of different studies. Most of the

collections were made during studies supported by funds provided through the University Center of Georgia and through Dr. George H. Boyd, Dean of the Graduate School, University of Georgia. Financial and other assistance from whatever source are gratefully acknowledged.

DEPARTMENT OF BOTANY, UNIVERSITY OF GEORGIA, ATHENS, GEORGIA.

A Fern Genus New to the United States

LILLIAN E. ARNOLD AND JOHN BECKNER

On March 10, 1953, Mr. Ray Garrett, an amateur plant-collector, discovered a large colony of a strange fern growing on the shoulders of Florida Highway 905 near Florida City, in Dade County, Florida, which was not identified at the time. On December 28, 1953, the junior author visited the locality and collected a number of specimens (his no. 302), which were divided among his own herbarium, and those of the University of Florida and the U. S. National Museum. The fern was abundant along several miles of roadside south of Florida City and grows also in the bayheads and willow-thickets in the adjacent wet prairies along with *Pteris vittata*, *Thelypteris normalis*, *Blechnum serrulatum*, ragweeds, goldenrods, grasses, and other weedy flowering plants. It is aggressive, and wherever established it has spread in all directions rapidly, choking out other plants. Sterile plants have some resemblance to variants of *Blechnum serrulatum* and they have perhaps been passed by for that reason.

The specimens were taken to the senior author, who recognized them as a species that she had collected in Jamaica, *Trismeria trifoliata* (L.) Diels. This is the first record of this genus in the United States. It is an-

other immigrant from the West Indies, where it is common. In all probability it has been recently introduced by natural means.

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Notes on Elaphoglossum, III. The Publication of Elaphoglossum and Rhipidopteris

C. V. MORTON

The two closely allied genera of ferns, *Elaphoglossum* and *Rhipidopteris*, one very large and the other very small, were included in the composite genus *Acrostichum* L. by early botanists. It is now generally agreed that they are not nearly related to the type species of *Acrostichum*, namely *A. aureum* L. The first botanist to suggest that they be separated was H. Schott. In his Genera Filicum, he proposed a segregate genus from *Acrostichum* which he called *Bolbitis*.[1] Following the description of this genus there is the following note:

"*Praeter Bolbitin alia duo genera: Elaphoglossum et Rhipidopteris, ab Acrostichis genuinis sunt segreganda. Prioris generis exempla sunt: E. simplex, conforme, apodum, viscosum, vestitum, etc. (Acrost. simplex, conforme etc. Auctorum); posterioris: Rh. Humboldtiana, peltata, foeniculacea et tripartita (Acrost. flabellatum, peltatum, etc., Auctorum.)*"

Christensen, in his Index Filicum, adopted these genera as validly published by Schott, but they cannot be so considered under the International Code of Botanical Nomenclature. There is not a word of description. Article 42 specifies that the name of a genus is not validly published unless it is accompanied either by a description of the genus or by the citation of a previously and

[1] Schott, Gen. Fil. *ad. t. 13.* 1834. The plates in the Genera Filicum are unnumbered. The publication of *Bolbitis* is generally said to be *t. 14*, but it is the 13th plate in my copy.

effectively published description under another name; Article 47 specifically states that a genus is not validated by mention of the included species.

Copeland[2] gives the publication of *Elaphoglossum* as J. Smith in Hooker and Bauer, Genera (1842) *Pl. 105A.* However, John Smith had previously published it in the Journal of Botany. The volume of the Journal is dated 1842, but the page on which *Elaphoglossum* is published appeared in August, 1841, or earlier. That it is surely earlier than the Genera Filicum is shown by the fact that Hooker and Bauer cite the reference to the Journal of Botany. The citation should be as follows:

ELAPHOGLOSSUM Schott ex J. Smith in Hook. Journ. Bot. **4**: 148. 1841.

However, *Rhipidopteris* was not taken up as a genus by Smith. He regards it as a subgenus of *Polybotrya.* Copeland gives the publication as "Fée, Acrost. (1845) 14, 78," and that is apparently the first validation of the name as a genus.

In spite of the universal adoption today of the generic name *Rhipidopteris*, it is not, however, the earliest name for the genus. In 1841 Link had assigned the name *Peltapteris* to this group and validly published it.

Link characterized his genus by placing it in the "Acrostichaceae" ("Sori, saltem demum, totam paginam frondis occupantes. Indusium nullum") and giving the following description:

"*Peltapteris. Acrostichum peltatum Sw. Frondes fructiferae peltatae, sterile digitatae.*"

This is a brief description but it is sufficient to characterize the genus among its relatives. Fée cited *Peltapteris* as a straight synonym of *Rhipidopteris;* consequently *Rhipidopteris* Schott ex Fée become illegitimate, since Fée did not adopt the earliest validly published name.

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[2] Genera Filicum 119. 1947.

The correct citation is as follows:

PELTAPTERIS Link, Fil. Sp. Hort. Reg. Bot. Berol. Cult. 147. 1841. *Rhipidopteris* Schott ex Fée, Mém. Foug. **2**: 14. 1844–45 (*nom. illegit.*).

The following new combinations are necessary. This genus is so small and so unimportant from any economic or horticultural viewpoint that it could hardly be considered desirable to conserve the name *Rhipidopteris*. The delimitation of the species is extremely debatable and deserves further study. There are probably only three species; one (*flabellata*) has the sterile fronds undivided or once- or twice-parted, with broad segments which are toothed at the apex; another (*peltata*) has the sterile blades 4–6-parted, with the ultimate segments not toothed at apex. Both the preceding have the fronds dichotomously divided. The third species (*tripartita*) has a pinnate type of organization; a rachis is present, terminating in a pinna; there are one or two pairs of lateral pinnae.

The combination *Peltapteris peltata* appears in Christensen's Index Filicum, but as a synonym only.

Peltapteris **flabellata** (Humb. & Bonpl.) Morton, comb. nov.

Acrostichum flabellatum Humb. & Bonpl. ex Willd. Sp. Plant. **5**: 110. 1810.

forma **Standleyi** (Maxon) Morton, comb. nov.

Rhipidopteris Standleyi Maxon, Amer. Fern Journ. **18**: 1. 1928.

This is the form with entire sterile blades; it occurs in Costa Rica, Panama, Venezuela, and Ecuador, and will probably be found also in Colombia. Occasional entire fronds may sometimes be found on plants with normally parted fronds.

Peltapteris **peltata** (Swartz) Morton, comb. nov.

Osmunda peltata Swartz, Prodr. Veg. Ind. Occ. 137. 1788.

forma **foeniculacea** (Hook. & Grev.) Morton, comb. nov.

Acrostichum foeniculaceum Hook. & Grev. Icon. Fil. *pl. 119.* 1829.

This is the most divided form, with the sterile blades 6-times parted and the ultimate segments filiform; it is rare, compared with the widespread f. *peltata.*

Peltapteris **tripartita** (Hook. & Grev.) Morton, comb. nov.
Acrostichum tripartitum Hook. & Grev. Icon. Fil. *pl. 118.* 1829.

This was originally described from a plant collected by Jameson in the province of Esmeraldas, Ecuador. It is apparently an exceedingly rare and local species. A form with a somewhat more divided blade was described from Mount Pichincha by Hieronymus as *Rhipidopteris tripartita* var. *subbiternata.* The third known collection represents this form, which is probably not deserving of nomenclatural recognition: Along Río Saloya, between Volcán Atacaso and Volcán Pichincha, *J. A. Steyermark* 52501.

SMITHSONIAN INSTITUTION, WASHINGTON, D. C.

Spore Studies in Dryopteris, II. Dryopteris celsa and D. separabilis

FERN WARD CRANE

In the writer's recent article on *Dryopteris* spores[1] the statement was made that "A study of spores and specimens so named [*D. celsa*] has confirmed its identification as a hybrid between *D. Clintoniana* and *D. Goldiana.*" Susbequent to the submission of that manuscript, the writer attended the American Fern Society field trip to the Dismal Swamp.[2] A number of ferns belonging to this group of *Dryopteris* were seen in the moist woods northeast of the dam, and collections were made of these. On examining the spores in the laboratory, it was found that the above quoted statement needs

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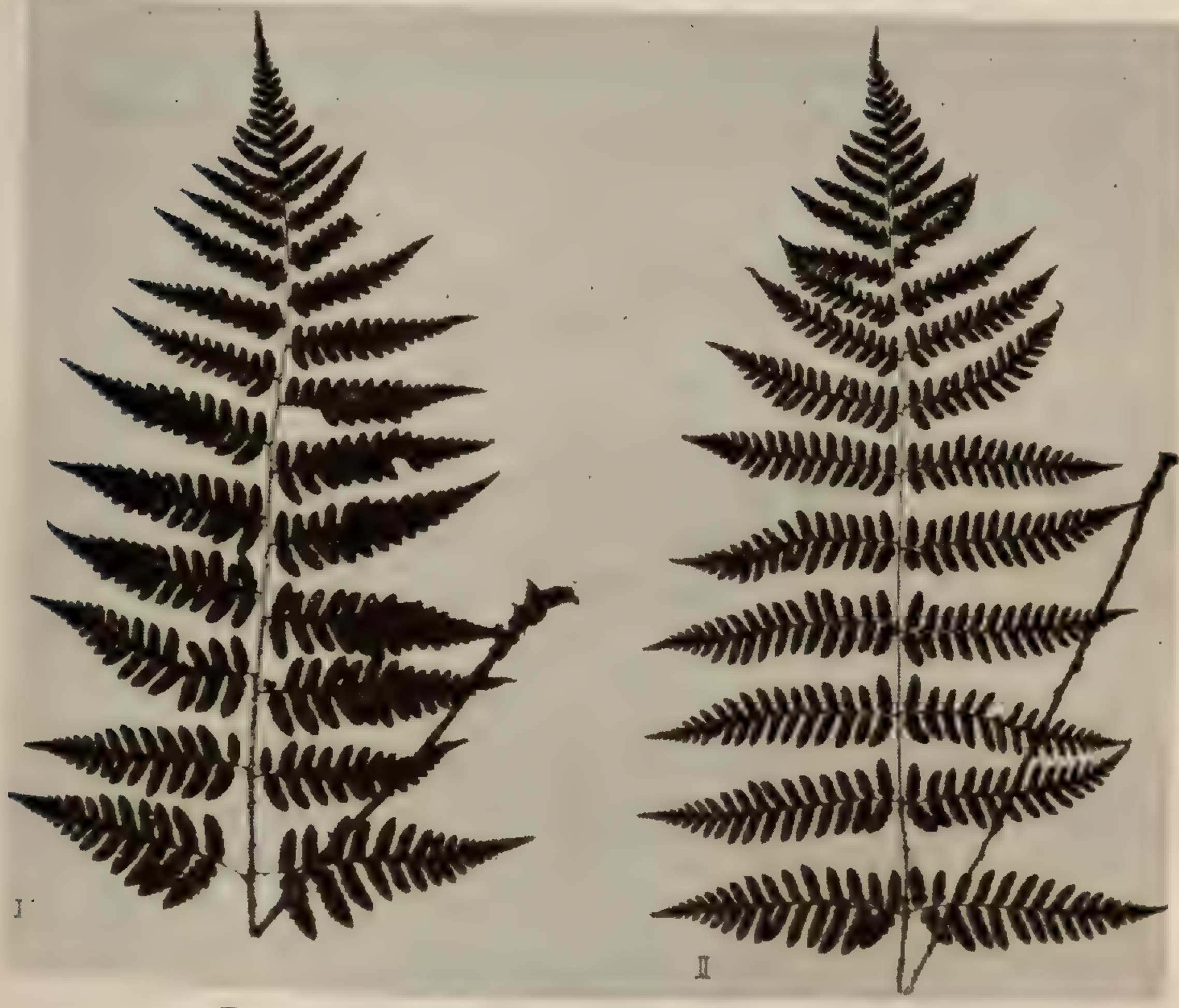
[1] This JOURNAL **43**: 159–169. 1953.
[2] *Ibid.* **43**: 133. 1953. My study was partly financed by a grant from the Penrose Fund of the American Philosophical Society.



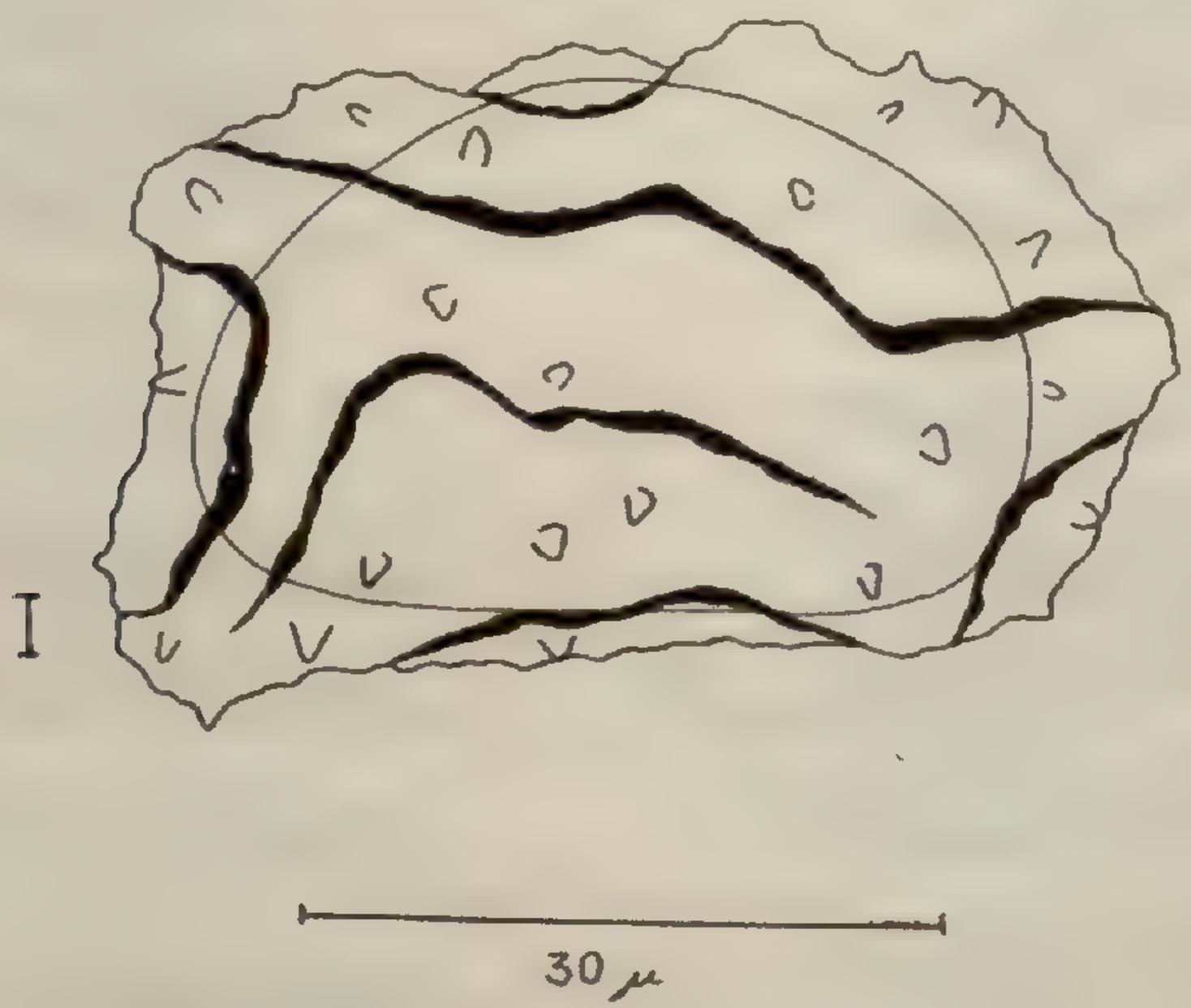
I. DRYOPTERIS CELSA. II. D. SEPARABILIS

complete revision. The ferns obtained proved to represent two different taxa, *D. celsa* (Palmer) Small and *D. separabilis* Small.

The spores of *D. celsa* are quite unlike anything previously figured; they are non-hybrid and of a character indicating an independent species. A few blunt-tipped spinules are set on the wide-winged perispore. On the other hand, *D. separabilis* does have spores characteristic of hybrids, thus confirming the view as to its nature Frond silhouettes and spore drawings of the two are presented here.

The writer's earlier observations had been made from herbarium sheets labelled or annotated as *D. celsa* by fern students whose judgement was considered reliable.

Re-examination of several of these sheets shows that they bore specimens of *D. Goldiana*, *D. Clintoniana* × *Goldiana*, × *D. separabilis*, and still other apparent hybrids. This note, therefore, may serve as a warning to other workers not to place too much dependence on identification based only on superficial morphologic observations in critical groups like the ferns of the general *D. Clintoniana* relationship.



I. SPORE OF D. CELSA. II. SPORE OF D. SEPARABILIS

SUMMIT, NEW JERSEY

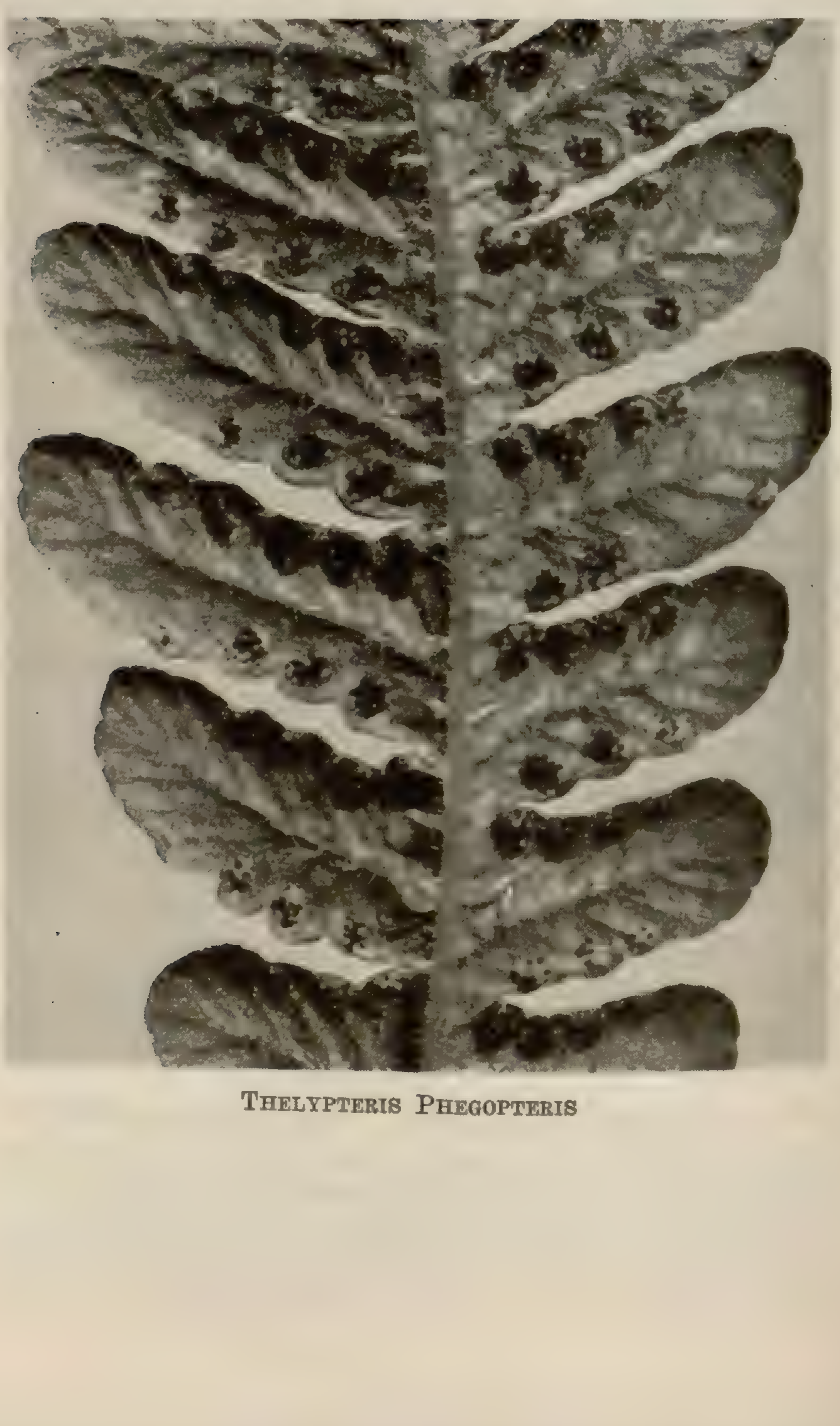
The Northern Beech-fern

C. V. MORTON AND CHARLES NEIDORF

The accompanying photograph of the northern beech-fern, *Thelypteris Phegopteris* (L.) Slosson, was made by the junior author from fresh material collected near Yonkers, New York. It shows an enlargement of the dorsal view of the middle of a young tinna. The conspicuous hairs along the midrib show up very well, as do those on the leaf-margins also. The veins, which reach the margin, are forked in this upper part of the frond, with the sorus placed dorsally on the distal fork. These are all characters that ally the beech-fern with the genus *Thelypteris*.

An interesting feature of the beech-fern that is not mentioned apparently in the American literature is the presence of two hairs on the walls of the sporangia; these are of two types—acicular and capitate-glandular—and are well described and illustrated[1] by that careful fern student Christian Luerssen. He indicates that there is some variation in these hairs—sometimes the acicular hair is replaced by a second glandular hair, and sometimes one or other is absent (or occasionally both absent on individual sporangia?). The glandular hairs can be made out barely in the photograph as minute white dots on the dark sporangia. A fine problem for a student would be a study of these hairs in the American beech-ferns. (They occur also in the broad beech-fern, *T. hexagonoptera*, but have never been described.) The presence of these hairs is another indication of relationship to *Thelypteris*, in which such hairs are found in various unrelated species; they are absent in the oak-fern (*Gymnocarpium*) and in *Dryopteris* sens. strict.

[1] Luerssen, C. Die Farnpflanzen Deutschlands, Oesterreichs und der Schweiz (Rabenhorst's Kryptogamen-Flora, ed. 2, vol. 3) *fig. 132.* 1889.



Thelypteris Phegopteris

The claims of the beech-fern to represent a distinct genus, *Phegopteris*, are rather slight. Neither absence of an indusium nor the long-creeping rhizome can be considered distinctive when all the exotic species are considered. Nevertheless, the matter can not be considered as entirely settled, for the beech-fern has been shown to have a different chromosome number from the marsh-fern, the type of *Thelypteris*. However, the chromosome numbers in the vast genus *Thelypteris* (several hundred species) are too little known to make it possible to draw any general conclusions yet.

A point worth noting is concerned with the date of the genus *Phegopteris*, which was published in Fée's Genera Filicum, the date of which has been uncertain and which is usually cited "1850–52." The recent investigation by Dr. Pichi-Sermolli[2] shows that in all probability this work was issued in December, 1852.

Cultivation of American Ferns in England

E. A. ELLIOT

Ferns from the United States are grown in England, but it is not easy for amateurs to get much information about their needs. I have had to go mostly by trial and error in growing the ferns that I raised from spores sent me by the late Mr. Matthew D. Mann, Jr., whose loss as a correspondent I most deeply regret.

My garden at South Stoke Vicarage is about 400 yards from the Thames River and about 200 feet above sea-level. The local soil is sandy. Beech-mold is worked in when planting ferns, but lime is excluded; if some ferns named below like lime they do very well without any. Our annual rainfall is about 25 inches and the average temperature 49° F. There is river-mist in the summer,

[2] Pichi-Sermolli, R. E. G. The Publication Date of Fée's Genera Filicum. Webbia 9: 361–366. 1953.

which can be very hot and dry, and fog in the autumn. The wind is often very strong in winter and the frosts hard.

ASPLENIUM PLATYNEURON. The note by Mr. Albert Chandler[1] on the cultivation of ebony spleenwort was of especial interest to me. My spores were sown in September, 1951, and germination was very good. Several of the sporelings lived. The best are in a round seed-pan, which is placed under staging in the greenhouse and shaded from the sun but receiving good light and air. They are watered every three days in summer. All my potted Aspleniums have their pots set in others a little larger to ensure drainage; this is not ornamental, but it achieves my aim of growing these delightful ferns.

ASPLENIUM ANGUSTIFOLIUM. Sown in September, 1951. There are now a dozen plants. After reading Mr. Mann's note regarding nematode disease a search was made and some traces of nematodes found; if the attack develops, these ferns must go. I do not know their usual habits, but my plants are deciduous.

DRYOPTERIS HEXAGONOPTERA var. SIMONSII. Sown in February, 1951. Germination was rather poor and slow; three sporelings were produced, of which two have died. The third has a few fronds two inches high; it is in my cold greenhouse.

POLYSTICHUM ACROSTICHOIDES f. GRAVESII and f. LANICEOLATUM. Sown in April, 1951. The germination was good, but only two plants have been raised, both of the same form. One was planted out in my fernery in July, 1953, and came through the very hard winter of 1954 without harm. The other was planted out last spring.

CYSTOPTERIS FRAGILIS. Sown in September, 1951. The germination was poor. One plant was given in 1953 to a friend specially interested in the genus; it came through the winter of 1954 in his rockery. Another plant does

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[1] This JOURNAL 44: 84–85. 1954.

well in my greenhouse.

CYSTOPTERIS BULBIFERA × FRAGILIS. This was later said by Mr. Mann to be *Woodsia obtusa.* Sown in September, 1952. The germination was very poor. One sporeling only is growing on; it looks like a *Cystopteris.*

CYSTOPTERIS BULBIFERA. Grown from bulbils sent to me from Hull University, Yorkshire. This has proved very hardy and has become a welcome weed which I do not eradicate in my outdoor fernery. It also does well under glass.

SOUTH STOKE VICARAGE, NEAR READING, BERKSHIRE, ENGLAND.

Recent Fern Literature

FERNS OF TENNESSEE,[1] by Dr. Jesse M. Shaver is the most important book on United States ferns to appear in recent years. It is a detailed and elaborate work which will be of value to all students of ferns. Most of the species treated are, of course, widely distributed in the eastern and southern United States. Each species is first treated in a general way and then described in detail. The comments are always interesting and informative. Each species is illustrated by a line-drawing and often by several very fine photographs of the plants in natural habitats. Variations are described and illustrated. There are maps showing the distribution and literature citations for each species. The citation of Tennessee specimens is conveniently given at the end of the book.

Most of this book was previously published in a long series of articles in the Journal of the Tennessee Academy of Sciences (1942–1954). As the author tells us in his preface, reprints were made as they appeared, re-

[1] pp. i–xvii, 1–502. *fig. 1–243.* Dec. 1954. Published by Bureau of Publications, George Peabody College for Teachers, Nashville 5, Tennessee. $6.00.

Dr. Jesse M. Shaver

paged so as to form a continuous book. The author fears that this may have led to some inequality between the first of the book and the last, an unfounded fear in my opinion, for the treatment is remarkably uniform; the author selected a suitable format and has maintained it consistently. The only deviation from the original plan is in the omission of the fern-allies, an omission occasioned by the unfortunate automobile accident that injured Professor Shaver and prevented him from completing a treatment of the fern-allies.

The fern rarities of the Tennessee flora are *Trichomanes Petersii* (one station found by Sharp in 1931), *Phyllitis Scolopendrium* (2 stations, one never relocated since the original discovery in 1849, the other still extant probably), *Dryopteris cristata* (one station found by Sharp and Underwood in 1933), *Botrychium alabamense* (2 stations, both discovered by Shaver), *Woodsia scopulina* [var. *appalachiana*] (2 stations, discovered by Shaver), *Phegopteris connectilis* [*Thelypteris Phegopteris*] (4 collections, all from Mount LeConte, first discovered by Sharp and Underwood in 1933), *Asplenium Trudellii* (2 definite stations), and *Woodwardia virginica* (2 definite stations). The *Botrychium* and *Woodsia* are new state records first reported by Shaver.

It is impossible to note here all the interesting comments and observations of Professor Shaver on natural habitats, geographic distribution, morphology, or nomenclature. There are extensive treatments of the variations of *Osmunda regalis, Asplenium platyneuron, Camptosorus, Dryopteris marginalis, Cystopteris, Botrychium dissectum*, and *Dryopteris Clintoniana* × *Goldiana*. The description of two forms (termed merely A and B) of *Adiantum Capillus-veneris* indicates the need for further study of this species. An interesting detail is the quotation of reports concerning the extent of the root-system of *Pteridium aquilinum;* no such

studies have been made in the United States, but reports from England show one main rootstock 89 feet long, and another 67 feet long, a single branch of the latter showing a length of 200 feet (including long laterals but excluding short ones). These extraordinary figures, obviously the result of much hard labor in excavation, show that many "colonies" of bracken are undoubtedly all single plants.

There is little if anything to criticize in this beautiful book,[1] an investment in which will surely not be regretted, for it will give great pleasure to all interested in ferns.—C. V. MORTON.

FERNS AND FERN ALLIES OF MINNESOTA.[2] This welcome addition to the growing list of state fern floras is less elaborate in some ways than the same author's Ferns of Wisconsin (in the absence of formal descriptions of the species and of habitat photographs), but is actually perhaps more useful, by reason of the fine line-drawings that have been added. The drawings of *Equisetum* are particularly noteworthy and should help to clarify this difficult genus to the average amateur. The species are all illustrated also by silhouettes of fronds or portions of fronds, evidently prepared according to the technique developed by Dr. Manton,[3] which are perhaps quite as satisfactory as ordinary photographs, at least for true ferns; this technique is not so good for "microphyllous"

[1] It might be mentioned that the authority for *Thelypteris palustris* is not "(Salisb.) Schott" but merely "Schott"; in his original description, Schott did not cite *Polypodium palustre* Salisb. or mention Salisbury in any way. Professor Shaver comments himself (in the Glossary) on the misuses of the terms dorsal, pinnula, and foveola (the latter used incorrectly for what is usually called hydathode).

[2] By Rolla M. Tryon, Jr. pp. i–xx. 1–166. *fig. 1–207*. *Maps 1–85*. University of Minnesota Press, Minneapolis, Minn. 1954. Paper $2.75, Cloth $4.00.

[3] Manton, I. Problems of Cytology and Evolution in the Pteridophyta, p. 299. 1950.

plants such as *Isoëtes, Lycopodium, Selaginella,* or *Equisetum.* The nomenclature adopted follows that in Gleason's New Britton and Brown Illustrated Flora rather closely.—C. V. MORTON.

RETICULATE EVOLUTION IN THE APPALACHIAN ASPLENIUMS.[1] Dr. Wagner's study of the relationships of *Asplenium platyneuron, A. montanum* and *Camptosorus rhizophyllus* was reported briefly in this Journal.[2] The present paper goes into much fuller detail and gives additional information, showing definitely from morphology and chromosome numbers that *A. Bradleyi* is a fertile hybrid between *A. montanum* and *A. platyneuron* and that *A. pinnatifidum* is a fertile hybrid between *A. montanum* and *C. rhizophyllus.* The third possible combination, *A. platyneuron* × *C. rhizophyllus* was long ago shown to be *A. ebenoides,* the Scott's spleenwort. Morphology indicates that the rare *A. kentuckiense* is a sterile triploid (*montanum* × *platyneuron* × *rhizophyllus*), derived by the crossing of *A. pinnatifidum* (*montanum* × *rhizophyllus*) with *platyneuron;* the absence of living material has made verification by actual chromosome counts impossible thus far. In this Journal[3] I gave it as my opinion, based wholly on superficial morphology, that *A. Trudellii* was only a well-developed state of *A. pinnatifidum,* but Dr. Wagner has shown me to be wrong. The chromosome count indicates that it is a sterile triploid and therefore a hybrid, in all probability *A. montanum* × *pinnatifidum.*

These results have taxonomic implications, of course, not only as regards the status of the species concerned but also their nomenclature. At the time Dr. Wherry

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[1] By Warren H. Wagner, Jr. Evolution 8: 103–118. *fig. 1–8.* 1954.

[2] A Cytological Study of the Appalachian Spleenworts. This JOURNAL 43: 109–114. 1953.

[3] 40: 244. 1950.

proposed the generic name ×*Asplenosorus*, *A. ebenoides* was the only hybrid known between *Asplenium* and *Camptosorus*, but now there are five more known hybrids and backcrosses (*A. pinnatifidum*, *A. Trudellii*, *A. Gravesii*, *A. kentuckiense*, and *A. inexpectatus*) and others are possible. There seem only two reasonable treatments—either all these are to be referred to ×*Asplenosorus* or else *Camptosorus* itself must be reduced to *Asplenium*. It is hardly possible to indicate that one solution is more "correct" than the other, for at the present time, if not for an indefinite period, generic lines are drawn mostly in an arbitrary way, according to convenience. It is my present opinion that an enlarged "genus" *Asplenosorus* would not be convenient, because it would be difficult or impossible to define; it is better to revert to the Linnaean concept and call the walking-fern *Asplenium rhizophyllum* L.

Dr. Wagner's drawings of leaf variations and of epidermal cells and stomata are very fine, and commendably (and unusually) the source of the material used for the drawings is clearly indicated. This paper will be of interest to many. Dr. Wagner has graciously presented a number of copies to be distributed to all interested; requests should be addressed to the undersigned. —C. V. MORTON, Smithsonian Institution, Washington, D. C.

NEUE UND KRITISCHE HOCHANDINE UROSTACHYSARTEN.[1] Dr. Herter, the chief authority on the Lycopodiaceae at present, segregates the allies of *Lycopodium Selago* as a distinct genus, under the name *Urostachys*.[2] This group, which includes about four-fifths of the species of *Lycopodium*, is especially well-developed in South America,

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[1] By W. G. Herter. Revista Sudamer. Bot. 10: 110–129. 1953.

[2] *Urostachys* is apparently not the correct name, as pointed out by Rothmaler. It has been proposed for conservation by Herter.

where about 200 species are known. The present paper adds 21 new species from the Andes, based on recent collections by Cuatrecasas, Killip, Core, Drew, Haught, Ewan, and others.—C. V. MORTON.

"Chromosome Studies on Ferns"[1] gives chromosome photographs and counts for 28 species, one form, and one hybrid of specimens collected in southern Ontario. Of the 19 genera of Polypodiaceae described in Gray's Manual, 16 have been studied by this author. Polyploidy is demonstrated in several genera.—C.V.M.

The latest publication by our Australian member, Miss Mary D. Tindale, is "Studies in Australian Pteridophytes, No. 1.[2] It discusses *Athyrium assimile* (*A. umbrosum* var. *tenerum* F. M. Bailey), *Hemitelia australis* (= *Cyathea Leichhardtiana*), *Lycopodium deuterodensum* Herter (syn. *L. densum* Lab. non Lam.), and *Marsilea mutica* (syn. *M. Brownii* A. Br.).—C. V. Morton.

American Fern Society

Report of the President for 1954

In the first year of the Fern Society's existence, in 1893, it was possible for the score or so of members to keep in touch with each other without much trouble. Letters, the exchange of specimens, and occasional field trips were easily feasible means by which every member could know something of what other members were doing. In 1954, however, which ended with a total membership of 560, the only community of experience possible for the Society as a whole is to be found in the Fern Journal, with its articles and officers' reports. Once a year, these annual reports review the activities

[1] by Donald M. Britton, Amer. Journ. Bot. **40**: 575–583. *fig. 1–38.* 1953.

[2] Contributions from the New South Wales National Herbarium **2**: 5–12. *pl. 1, 2.* 1953.

of the Society, and summarize its status. Currently the reports present an imposing and gratifying picture of the growth in membership and of a healthy financial condition. But summaries and statistics are necessarily cold and impersonal. Because of the completeness of the other reports, the President is relieved of responsibility for offering statistics. However, through extensive correspondence with members and officers and contacts on field trips, the President has been in direct and indirect touch with a considerable segment of the Society's membership. For this reason, his report can attempt to get behind the curtain of statistics, and to present details, necessarily sparse, of particular people and particular occurrences—the items out of which statistics are built.

Look at the Treasurer's report; so many dollars received from regular membership dues, so many from sustaining memberships, so many from the sale of back numbers, and so on. The increase in the amount of regular dues is evidence of a larger number of people interested in the study of ferns; it also means that members have been active in inviting their friends to join the Society. The increase in sustaining membership dues is an expression of the good will that the Society has aroused. The figures for the sale of back numbers mean both an ever-widening recognition by scientific institutions of the standing of the Fern Journal and also that present members find they want the information that back numbers can provide. Nowhere, however, does the Treasurer's report mention the Christmas holidays which Ronald McGregor spent in preparing the more than seven hundred annual statements for members and subscribers, and in folding and inserting 560 field-trip notices; nor the fact that during January he might receive as many as 90 communications in a single day for entering and other bookkeeping. The Secre-

tary's report gives the total of new members received and of members withdrawn, but it does not record the multitudinous correspondence which this office entails, nor that Mildred Faust started her service by many hours of work in setting up a completely new card-file system of membership records.

The numerical statistics of Society membership were amplified during 1954 by the issuance of a new membership list, which required the combined efforts of Secretary, Treasurer, and Editor for its preparation. Similarly, the lists of new members and of changes in addresses which appear in each number have meant the joint work of these three officers in correspondence, checking, and proof-reading. In these lists, one may find many of the details out of which various statistical summaries could be made: In how many countries is the membership distributed? In what states are the largest number of members? Are there any states without representation?

One question of interest can be only incompletely answered from a study of the lists of actual members, that is, their distribution in different walks of life. Mailing addresses at scientific institutions and colleges offer some evidence of the proportion of professional botanists in the total membership. Members among the medical profession are partly indicated by title. The writer's correspondence gives a picture of the utmost diversity; all sorts of professions, businesses, and crafts are included. In this group of lay members there is the widest range of knowledge of ferns, from the veriest tyro to authors of very competent articles and fern books. Many real "experts" in field work, in the differentiation of species, in fern culture, and in fern photography are "lay" members in the sense that they are not professional botanists. The following paragraphs give a few items of specific interest about Society membership

during 1954.

In the death of Liberty Hyde Bailey at the age of ninety-six, the Society lost its most distinguished member, the dean of American botanists. While his actual work was not directly concerned with ferns, in two of the publications for which he was responsible, the Standard Cyclopedia of Horticulture and the Manual of Cultivated Plants, are to be found the most extensive treatment of cultivated ferns in United States literature. In the last edition of the Manual, 120 species are keyed and described.

Three of the newest members may be mentioned as at the other end of the scale of botanical activity: Merrill Sweet, High School senior of East Canaan, Conn., James Pringle, undergraduate at Dartmouth, and Satish C. Varma, M.Sc., graduate student, Research Scholar in botany at the University of Punjab, India. The last two will appear as new members, starting with 1955. All three are interested in ferns and are prospective botanists and potential future research workers. A request which Mr. Varma makes for reprints is referred to readers who may wish to send available copies of their reprints to all three.

In a country newspaper the following items would come under the heading of Personalia. Messrs. Clair Brown, Donovan Correll, Pierre Dansereau, Raymond Fosberg, James Kucyniak, Conrad Morton, R. Pichi-Sermolli, Nicholas Polunin, Marcel Raymond, and Rolla Tryon, and Mrs. Tryon and Mrs. Valentine and perhaps others attended the meeting in July of the Eighth International Botanical Congress in Paris. Conrad Morton was abroad for six months under a Guggenheim Fellowship grant for the photographing of fern types in the principal European herbaria; starting with a goal of at least 800 photographs, he came back with

over 8000. Charles Neidorf has added several additional species to his collection of photographic enlargements of native ferns. Jesse Shaver has published a much-praised "Ferns of Tennessee." Harold Rugg, after spending weeks in the southwest during the spring, spent more weeks in England during the summer, and hobnobbed with members of the British Pteridological Society in their summer field-trip. Edgar Wherry, who must certainly have the record for the number of miles spent in the United States in pursuit of ferns, added two trips to Florida, plus a few shorter trips. Dale Hagenah found a second station for hart's tongue in Michigan, and much larger than the one reported found in 1953. Of some of the above items, more extended reports in the Fern Journal may be expected.

The reports of a number of the scheduled field-trips of the Society, given elsewhere in this number, have been, perhaps inadvisedly, shortened for reasons of space by the leaving out of the names of the scores of attendants. More than any other activity, these field-trips have served to establish new acquaintances and to renew old ones, as well as to enlarge the knowledge of native ferns and fern localities.

Finally, two new ventures of the Society may be noted: The new Society fern garden at the National Arboretum in Washington was launched at a meeting in May, which is reported on by its instigator and leader, James Johnston, Jr.; his report does not say anything about the spade work which he has literally done. The new fern spore repository and exchange, which will be reported on another time, has made a very creditable start, thanks to a deal of correspondence and other work by Kathryn Boydston.

Respectfully submitted,

R. C. BENEDICT, *President*

Report of the Treasurer for 1954

In March of 1954 the writer took over the Treasurer's duties of the American Fern Society from the Acting Treasurer Mr. Walter S. Allen. The records were in perfect order and the Treasurer's work well organized for the year by Mr. Allen.

The income from dues of members and subscribers, sale of back numbers, etc., added to the cash on hand January 1, 1954, amounted to $3,492.04—the highest on record for the society. Sustaining members contributed $295.00, sale of back numbers of the Journal amounted to $184.67 and sale of surplus library books added $41.25. These and gifts of $58.25 contributed much to the financial success of the Society. Publication costs amount to $1,657.04 for the four issues—nearly 80% of our total expenses.

No withdrawals have been made from the reserve fund or the two special accounts. The Society is in a good financial condition, thanks to response of its members.

Receipts	*Amount*	*Total*
Cash on hand, January 1, 1954		$1,247.44
1953 membership arrears	$ 45.00	
1954 membership renewals	717.18	
1954 sustaining members	295.00	
1954 new members	129.55	
1955 membership renewals	20.00	
1953 subscription arrears	4.35	
1954 subscription renewals	172.55	
1955 subscription renewals	237.85	
Life memberships	155.00	
Sale of back numbers	184.67	
Sale of reprints	153.95	
Sale of surplus library books	41.25	
1954 advertising	30.00	
Gifts	58.25	
		2,244.60
		$3,492.04

Disbursements	*Amount*	*Total*
A. F. J. Vol. 43, No. 4	$516.87	
A. F. J. Vol. 44, No. 1	477.07	
A. F. J. Vol. 44, No. 2	383.33	
A. F. J. Vol. 44, No. 3	279.77	
Envelopes—mailing	33.37	
Printing membership list	65.00	
Reprints	174.59	
Expenses		
President	38.54	
Secretary	52.43	
Treasurer	99.74	
Editor	18.62	
Curator of Herbarium		
Miscellaneous	36.91	
		2,176.24
Cash on hand, January 1, 1955		$1,315.80

STATEMENT DECEMBER 31, 1954

Assets	*Amount*
Cash on hand	$1,315.80
Bissell Herbarium Bequest	599.58
Life Membership Fund	688.38
Reserve Fund	1,641.12
Inventory A. F. J.	3,299.85
A. F. S. Library	500.00
	$8,044.73

Liabilities	*Amount*
Capital Account	$6,086.07
Suspense credit	
1955 memberships	20.00
1955 subscriptions	237.85
Distribution Vol. 44, No. 4 A. F. J.	412.85
Bissell Herbarium Fund	599.58
Life Membership Fund	688.38
	$8,044.73

Respectfully submitted,

RONALD L. MCGREGOR, *Treasurer*

Report of the Auditing Committee

We hereby certify that we have seen the books and accounts of Dr. Ronald L. McGregor, Treasurer of the American Fern Society, and have obtained confirmation of the correctness of the Society's balances on hand, as set forth in detail in the accompanying report of the Treasurer.

L. J. Gier
Emily L. Hartman
Auditing Committee

Report of the Secretary for 1954

The total membership for the Society at the end of 1954 was 560, and there were two more new life memberships in the latter part of the year which will be recorded in 1955. Seventy-six new members were added during the year and 32 withdrawn. Five of the new ones are from countries outside of the United States. The largest number of new members come from the northeastern states, although 42 per cent of the United States members are from the Middle West and West. There are 183 subscribers, of which 13 are new; two withdrew during the year. Seven of the new subscribers are from outside of the United States. In March, Mr. Walter S. Allen prepared a complete tabulation of the membership from 1947 through 1953, and also added to the files a list of membership distribution according to states. One observation from this compilation is the decided increase in membership in 1952 and its continued rise thereafter.

We deeply regret to report the deaths of the following members, most of whom were members for many years: Dr. Liberty Hyde Bailey (1921), Mr. Ralph S. Earle (1927), Mr. Howard Gilmore (1941), Mr. Calvin Goodrich (1951), Mrs. Edwin A. Hayes (1934), Mr. W. C. Legg (1941), Miss Elsie M. Kittredge (1922), Mrs. C. E. Moss (1916), Prof. A. Vincent Osmun (1901), Mrs.

Elizabeth Richards (1939). Prof. Osmun was Secretary of the Society in 1904.

As the President has stated in his report, a great deal of the success of the year is due to the excellent series of field-trips, for which credit is due to the careful organization of the President and to the cooperation of the leaders, who not only arranged trips to see usual and rare ferns to best advantage, but outdid themselves in entertaining everyone. They also encouraged informal discussions which were both exhilarating and stimulating to all.

The annual meeting of the Society was held with the A.I.B.S. at the University of Florida at Gainesville, Monday, September 6. Dr. Edgar T. Wherry presided at the informal meeting which consisted of: Reports of the trips in the Great Smokies and in Southern Florida, with examples of some ferns collected, and a display of mounted Florida ferns by Mrs. W. D. Diddell. Plans were then made to change the scheduled Wednesday trip to Monday and continue the all day Thursday one as scheduled. In the absence of Mr. John Beckner, we were unusually fortunate in having such an able leader as Mr. Leonard J. Brass of the Archbold Biological Station, Lake Placid, Fla., take charge of all three of the Florida field-trips. The rest of Monday was spent mainly at Buzzard's Roost, Devil's Millhopper, and the Sante Fe River region; the Thursday trip was in the Orange Lake region and at the Sink Hole on the property of Donald McKay.

The annual meeting of the Fern Society will be held at Michigan State College, East Lansing, Michigan, during the A.I.B.S. meetings in September. It is hoped that many members will be able to attend, and also go on the preliminary field-trip to the Bruce Peninsula.

Respectfully submitted,

MILDRED E. FAUST, *Secretary*

Report of the Judge of Elections

Two hundred and fifty-eight votes were cast in this year's election of officers for the American Fern Society, as follows:

For President

R. C. Benedict	253
Warren H. Wagner	1

For Vice-President

Dwight M. Moore	251
Edgar T. Wherry	1

For Secretary

Mildred E. Faust	252

For Treasurer

Ronald L. McGregor	252

For the amendment	224
Against the amendment	13

I therefore declare the following candidates elected to the several offices: President, Ralph C. Benedict; Vice-President, Dwight M. Moore; Secretary, Mildred E. Faust; Treasurer, Ronald L. McGregor. The amendment increasing the fee for life membership from $35.00 to $50.00: Carried.

Respectfully submitted,
J. E. BENEDICT, JR., *Judge of Elections*

Report of the Editors for 1954

The Fern Journal published 168 pages in the volume for 1954, more than the average number for recent years. We anticipate that the next volume can contain about the same number of pages, in spite of a slight increase announced in printing costs, by reason of the generous response of our sustaining members. Numbers two and three of the last volume were kindly edited by our Associate Editor, Dr. A. C. Smith, in the absence on business of the undersigned.

We have acquired a set of bound copies of volumes 19 to 25 inclusive of the Journal, which are available for sale at $3.00 a volume. Here is a chance to start a collection of back numbers of the Journal with nicely bound copies.—C. V. MORTON.

Report of the Curator and Librarian for 1954

A number of requests have been answered the past year by the loan of fern books or specimens from the Society's Library and Herbarium. However, it would seem that both collections might be used by the members to a greater extent than they have been in the past. Although we do not have a current list of the contents of the Library and it is hardly feasible to draw up a list of the species in the Herbarium, each is an excellent and representative collection. Any publication on the ferns of North America is likely to be in the Library and the Herbarium contains nearly all of the species of the United States. In addition, there are a considerable number of books and specimens relating to European and tropical American ferns. So please do not hesitate to send in your requests; we probably have the material that you want.

The Library has received as a donation from Mrs. M. D. Mann, Jr., the fern library of our late Treasurer, Mr. Mann, and it contains a number of books not previously represented in the Society's Library. We are grateful for this useful gift. Dr. E. T. Wherry presented the Herbarium with a parcel of specimens. These include a number of Equisetums which were particularly welcome because at a former time many of the specimens of this genus were damaged.

Respectfully submitted,

ROLLA M. TRYON, JR., *Curator* and *Librarian*

Report of the Field-trips in 1954

Following the schedule announced in special January and May bulletins, the members of the Fern Society took part during 1954 in nine separate field meetings, involving localities in eight states and the District of Columbia. Four of these meetings were one-day and one-locality affairs; the others covered two to five days, and usually several localities in each day. Upwards of 200 were registered in attendance for the series taken as a whole, of which total perhaps 20 attended two or more meetings, including one member, our Secretary, Prof. Mildred Faust, who followed ferns in Arkansas, New York, and Florida.

It is not practicable or at present possible to report accurately the total number of different species and subsidiary forms which were met with during all the trips. The Tennessee list presents one of the most distinctive series of the more northern states, with two filmy-fern species, two of *Cheilanthes*, and several small Asplenium not found in the northeastern areas. On the eastern trips any one day was almost sure to turn up 40 species or more plus some hybrids and varieties, and including several less common or rare kinds. Although most of the meetings were devoted to visiting ferns in their native habitats, at least nine fern gardens were included, which always added many distinctive sorts, including various exotic species and varieties. The home-site of one of the rarest northern kinds demanded a climb down a declivity so steep that the leader had provided rope handholds. At one site, with no obvious hazards, the writer broke a rib but the group fortunately included three physicians and a trained nurse! Several self-styled "fellow travellers" were usually present on these trips, but not of the sort liable to bring the Society under Senatorial investigation. Some of these husbands and wives began to take increasing in-

terest in the botanical objectives of the Fern Society.

The planning and the actual leadership for these 20 days of field-trips represented the work of a much larger number of members than can readily be listed. Besides the actual field leadership involving over a score of members, at least as many more were involved in the advance scouting, the correspondence, the arranging for over-night accommodations, the recording of species seen and of attendance, and for the evening hospitalities, which usually involved the wives of leaders.

In the paragraphs which follow, summary accounts are given of most of the meetings, and separate reports follow for the New England and Florida trips. None of these accounts, no matter how long, is adequate to express the enjoyment of those who were in attendance, or the appreciation that was felt for the work of the planners and leaders.

MAY 1. WASHINGTON, D. C. Leader: Dr. James W. Johnston, Jr. This first meeting in 1954 served to inaugurate the new Fern Garden of the American Fern Society at the National Arboretum which Dr. Johnston initiated. Dr. Skinner, Director of the Arboretum, greeted the 20 who attended. Dr. Johnston then took the group on a tour of the sites which had been selected for their appropriateness for fern naturalization and explained the general plans for the project. These include the enlistment of a working group from the Fern Society membership of the vicinity for the actual development of the new garden, and the assemblage of representative groups of plants of as many fern species as may be adapted for the environment. Donations not only of labor but also of specimens from various parts of the country are requested for the expansion of the collection.

MAY 23. SOUTH CANAAN, CONNECTICUT. Leader: Mr. Boughton Cobb. Fifteen members convened from various points of the compass, to see Mr. Cobb's fern garden and that of another member, Mr. Lincoln Foster, in Falls Village. Both gardens are unusual in the terrain they occupy—narrow areas at the foot of steep rocky hillsides. In both, torrential brooks cascade down the hillside past or through the gardens, affording ideal spots for some of the moisture-loving fern species. In the main part of Mr. Cobb's garden, some 80 species and varieties are growing in ascending levels in a small area, with a stretch of fine lawn as foreground. Among the wide representation of native and some English types were plants of the new variety of *Cystopteris bulbifera*, recently described in the Fern Journal, and an unknown species, since identified by Mr. Morton as *Thelypteris decursive-pinnata* of eastern Asia. Mr. Foster's garden contained a good selection of native ferns, with a large and showy series of flowering rock-garden plants. In his garden, the plunging brook disappears underground, to reappear some hundreds of feet away in an open pasture.

The afternoon was spent on the wooded limy knoll on a neighbor's farm, which provided swampy and upland habitats for a good population of mostly common species. Numerous colonies of oak ferns were interesting in having apparently a much fuller leafage than is usual for the species.

JUNE 6. AUDUBON NATURE CENTER, GREENWICH, CONNECTICUT. Leader: Mr. Leonard Bradley, of the Center staff. At this meeting, held jointly with the Connecticut Botanical Society, 24 people were in attendance. Mr. Bradley led the group for a wide-ranging trip over much of the more than 400 acres of the

Audubon Center. Native woodland, on rocky hillsides and in lush swamps, provided excellent sites for a recorded total of 41 ferns and lycopods, practically all growing as original natives, although a few kinds have been naturalized in favorable locations. Many may think of the Audubon Society and its various stations as primarily devoted to the study and interests of birds, but the program and activities are wider, and cover native plants, as well as birds and other animals. The education courses, including continuous summer sessions of successive short-term classes for teachers and others, cover the field of plant-life as well as that of birds. The Greenwich Center is well provided with native ferns. The Fern Society is glad to welcome Mr. Charles Mohr, Director of the Center, as one of its new members.

JUNE 15–20. OZARK AND OUACHITAS MOUNTAINS, ARKANSAS. Leader: Prof. Dwight M. Moore. Under the auspices of the Central States Section of the Botanical Society of America, 29 botanists convened from nine states for a summer foray in Arkansas, nine of whom were members of the Fern Society, two, Mildred Faust and Nettie Sadler, having made the longest trip, from Syracuse, N. Y. An elaborate and detailed 13-page outline and itinerary was prepared for those attending. No complete fern-list is at hand, but the prospectus cites such species as *Ophioglossum Engelmannii, Woodsia scopulina, Cheilanthes alabamensis, Pilularia,* and *Isoëtes.* The southern complexion of the region is indicated by a few lines on page 3: "Alligators are here but we will probably not see any as they are rather shy!! But, in walking along the edge of the lake, *Be Alert* for *Cottonmouth Moccasins!* The poisonous coral snakes also have been found here, but I have never seen any."

AUGUST 13–18. EASTERN NEW YORK STATE. Four localities were visited, in each of which separate leaders and hosts were involved:

HAINES FALLS.[1] Leader: Mr. Edward M. Shields. A dozen visitors arrived the evening of August 13 and were entertained for two nights and for all meals by members of the Garden Club of Twilight Park, Haines Falls. The first evening, joined by several from nearby, they met at Mr. Shields' home where plans for the next day's trip and many topics of general interest were discussed. Dr. Benedict told how his interest in ferns had been aroused by a high school teacher of Syracuse. Dr. Wherry admitted that he had not known one fern from another until, engaged in mineralogical-chemical research in the U. S. National Museum, he read that the walking fern was a "lime-lover"; on learning what it looked like, he soon found it on many kinds of rocks other than limestone, and came to the conclusion that plants showing such apparent preferences should be termed not calciphiles, or "lime-lovers," but calcicolous, or "lime-dwelling," since they grow where they do because competition by more vigorous species prevents their getting started elsewhere.

Saturday morning, August 14, the group visited the remarkable colony of *Dryopteris fragrans* that Eddie Shields had discovered some years before; it was in good shape. The one other rarity was a clump of *Lycopodium Selago*, out of reach on a cliff. Saturday afternoon, the group descended into a precipitous part of the Haines ravine to see *Woodsia glabella*, which, like the fragrant-fern, is at the southern limit of its range. The eastern holly-fern, *Polystichum Braunii*, is well developed in the ravine. Later, many of the group drove over to visit Mr. Henry Dunbar's place near Phoenicia, and to South Lake, at Kaaterskill, where *Isoëtes muricata* was collected. *Dryopteris campyloptera* was an-

[1] Account contributed by Dr. E. T. Wherry.

other of the day's collections.

The evening of the 14th was spent at Mr. Shields' home. Exhibits were the order of the day, with showings of Mr. Charles Neidorf's ever-growing collection of magnificent photographs of sorus-bearing fern leaves, Miss Hires' collection of photomicrographs of fern spores, and a series of herbarium specimens. The Haines Falls meeting was a much-photographed Fern Society affair. During the afternoon, hundreds of film exposures were made by a professional photographer, representing the Chevrolet magazine, Friends. The exposures were chiefly of the fern followers with a background of Mr. Shields' beautiful massed-planting of native ferns back of his house, and of their rope scramble down and up the ravine. Some day, the story with pictures is due to be published as an example of the kind of outing a Chevrolet makes possible.

ALBANY. Leader: Mrs. Robert D. Glasgow. It was not a long drive from Haines Falls to the Albany home of Mrs. Glasgow, the next meeting place. After inspection of Mrs. Glasgow's fern garden, the group, augmented by a number of persons from the Albany area, made a morning visit to an excellent *Dryopteris Goldiana* site. This species had its usual companion, *Athyrium pycnocarpon*, plus thrifty plants of other commoner species, and provided also the usual hybrid with *D. marginalis*. Lunch was served to the group at the home of Dr. Gertrude Douglas, in a country setting. In the afternoon, two limestone ledge and bank localities were visited, the first providing fine plants of *Asplenium Ruta-muraria* and *Pellaea atropurpurea*, and the second, a shaded slope and flat area, provided the most abundant growth of *Asplenium Trichomanes* and *A. platyneuron* that this recorder has ever seen. A search for the possible hybrid between these two species was not fruitful.

DR. BENEDICT AND GROUP OF MEMBERS

PILOT KNOB, GLENS FALLS, AND WILTON. Leaders: R. C. Benedict, William H. Mann, Sr., and Dr. Orra A. Phelps. The Pilot Knob over-night accommodations were easily reached in time for the evening meal on August 15. Two evenings were spent at the writer's home, with discussion more on social than botanical topics. The next day visits were made to the Benedict fern plantings, to the nearby locality where the putative hybrid adventive, *D. Clintoniana* × *Goldiana* was seen, and to a small bog with *Woodwardia virginica*, which was not seen on the visits of earlier years. Enlargement of the fern garden had provided special sites for the series of fern sporelings Mr. M. D. Mann, Jr. had been raising. Among these, hart's-tongue plants reached fruiting stage in this, their second year of growth. × *Asplenosorus ebenoides*, from a fertile strain, and small *Pellaea* plants had started good growth. Some hart's-tongue sporelings planted the previous summer had come through the winter in good shape. Planted among various native species and hybrids is a series of introduced species, most of which had wintered well—*Dryopteris erythrosora*, *Athyrium Goeringianum* (both "plain" and the variegated variety "pictum"), a crested form of European male-fern, forms of *Polystichum aculeatum* and *setiferum* (*angulare*), and even one plant of *Cyrtomium Fortunei*, the latter barely making its second year. The question marks for the next winter were numerous young plants of *Dryopteris ludoviciana* from Florida spores and of the coastal English *Asplenium marinum*, both among the sporelings from Mr. Mann.

The morning of Aug. 17 saw the group on its way to Glens Falls and a brief visit to a limestone ledge area near Mr. Mann's nursery, with thrifty growth of maidenhair and *Cystopteris bulbifera*. Next, with Dr. Phelps in charge, visits were made to several areas in

Saratoga County, ending near Wilton. These stops were in the nature of "new" localities, which, even though no special finds may be turned up, are always of interest.

AUG. 19. JAMESVILLE. Leader: Dr. Mildred E. Faust. The hart's-tongue site at the Clark Reservation is always worth a visit. Although "outside" registration for this particular trip on August 19 of the New York series was limited to Mr. and Mrs. David Emory, a number of local Syracuse fern lovers joined to make a good group. The hart's-tongue colony was found in thriving condition.

AUGUST 27–29. KENTUCKY AND TENNESSEE. Leader: Dr. A. J. Sharp. The following is quoted from a letter from Dr. Sharp: "We had a small attendance on a good foray: Rev. F. D. Stevenson, Mrs. J. K. Grannis, Mr. David Emory, Mr. James Wells, and Dr. A. J. Sharp. All of us were together in Kentucky, but only the last three went to the Great Smoky Mountains. On the trip we saw at least 30 species, including *Trichomanes Boschianum, T. Petersii, Osmunda* (2 spp.), *Woodsia obtusa, Cystopteris fragilis, Dryopteris marginalis, D. spinulosa* var. *intermedia, Thelypteris noveboracensis, T. hexagonoptera, Onoclea sensibilis, Polypodium virginianum, P. polypodioides, Lygodium, Athyrium pycnocarpon* and *A. Filix-femina, Asplenium pinnatifidum, A. montanum, A. resiliens, A. platyneuron, A. Trudellii, Camptosorus, Cheilanthes lanosa, C. tomentosa, Pteridium, Polystichum acrostichoides, Adiantum pedatum, Pellaea atropurpurea,* and several Lycopodiums."—R. C. BENEDICT.

Report of the New England Field-trip

The summer field-trip of the Fern Society, which began July 16 and ended July 18, 1954, was under the leadership of Walter S. Allen and Cyrus Darling. We started at Amherst, Massachusetts, where Robert L.

Coffin showed us Professor Osman's fern garden, and then led us to Plum Tree Swamp, in North Amherst, where *Dryopteris simulata* could be observed in a comparatively dry site and where *Lygodium palmatum* was to be seen in abundance in a sedge-shrub marsh. Later in the day we visited the experimental forest of the University of Massachusetts on Mount Toby, Leverett, Massachusetts. Botanists who know this famous wildlife preserve have seen 45 species of ferns in a five-mile hike. Our outstanding find was a large colony of ostrich-fern, in which many fronds exceeded seven feet in height. The woods nearby disclosed several limestone-loving species, together with *Athyrium pycnocarpon* and *Dryopteris Goldiana*, and also a plant of *D. Goldiana* × *marginalis*.

On July 17, Mr. Darling led the party to Hinesburg, Vermont, which has a rich fern flora. An old road cut clothed with many small and medium-sized ferns especially elicited outspoken admiration. Pleasant Valley Reservoir Road, near Brattleboro, was visited next, where Walter Allen found a *Botrychium virginianum* 40 inches tall, which was presented to Mrs. Charlotte Learned for her herbarium. Here a droll incident occurred while the party was diligently scouring the woods adjoining a narrow, inclined road. The lady who owned the land drove up and demanded to be informed of our intentions. When told, she at first objected, but later changed her mind, because she had noted that all the ferns on her land were diseased—they had black spots on them [sori, it turned out!]. The day was completed by a visit to Mr. Darling's three swamps at Dummerston, Vermont, where many plants of *Dryopteris* were observed. The owner's generosity enabled us to take specimens of several Botrychiums (including *B. simplex*) from colonies on some higher, drier sites. That evening Cyrus and Charlina Darling served a picnic dinner at their "Hepat-

ica Hill,'' which afforded a fine vista of the mountains.

On July 18, we examined Mr. Darling's fern garden with its several rarities, among them a thrifty plant of *Dryopteris fragrans*, collected in the Catskill Mountains in July, 1953. We then visited a large colony of *Woodsia ilvensis* above the residence on Black Mountain Road. The fronds of the *Woodsia* were of large size for this species, about 14 inches long. Finally, we proceeded to the home of Dr. and Mrs. Benjamin R. Allison, at Alstead Center, New Hampshire, where we were treated to a sumptuous buffet dinner. Dr. Allison's beautifully designed fern garden is convincing testimony to what can be done by industry, imagination, and ferns. Of the sixty species and varieties perhaps the most noteworthy were the crested European hart's-tongues.

The outing was a pteridological and social success. A total of 49 different native ferns was reported by our recorder, Miss Scudder. Twenty-six members and friends participated in part or all of the excursions: Dr. Fred H. Allen, Mr. Walter Allen, Dr. and Mrs. Benjamin R. Allison, Miss Catherine M. Bacon, Dr. R. C. Benedict, Miss Alice A. Bristow, Miss Helen G. Bristow, Mr. Robert L. Coffin, Mr. R. A. Doray, Mr. and Mrs. Cyrus Darling, Miss Laura A. East, Dr. and Mrs. James W. Johnston, Jr., Mrs. William S. Learned, Mrs. D. C. Millett, Mr. and Mrs. Charles Neidorf, Mr. and Mrs. Robert W. Otto, Mr. J. L. Parker, Miss Anna E. Scudder, and Dr. and Mrs. Frank M. Wright. Of special note was the attendance at the Allison's of Mr. Chauncey Jackson Newell, a member of the Society since 1902.—JAMES W. JOHNSTON, JR.

Report of the Southern Florida Field trip

The Fern Society field party met at the Botany Department, University of Miami, at Coral Gables early in the afternoon of September 1. Some half-dozen members had been expected for the 3½-day trip, but with the

threat of a hurricane from the southeast, and, consequently, very disturbed and rainy weather, only Miss Gladys Clarke and David Emory turned up. I was substituting for John Beckner, who planned the itinerary but was prevented by other interests from attending. Fortunately, we were under a hospitable roof. So, with water streaming from the eaves and the downpour blurring the pine trees of the campus, we took advantage of the invitation of Dr. Taylor R. Alexander to examine the ferns in the herbarium.

Conditions improved about three o'clock, when we drove to Snapper Creek Canal, about five miles west of the University. There, on the edge of the Everglades, *Acrostichum aureum* grows with its roots below water-level; *Pycnodoria vittata, P. bahamensis, Pteridium caudatum*, and *Thelypteris normalis*, occur commonly in open and semi-open habitats. Returning to the coast, and taking the precaution to apply a repellent against redbug, we ended the day by examining one of the relic areas of "tropical" vegetation of the formerly great Brickell Hammock. In this development of, at best, depauperate and poorly developed rain-forest, ferns are few, and our only interesting find was *Asplenium dentatum*, occupying solution crannies in moistish half-shaded low cliffs of oolitic limestone which formed an old shore line.

Driving south next morning on Ingraham Highway, in greatly improved weather, short stops were made to view the very interesting pinelands flora of the Miami limestone ridge. Many herbs were in flower, and slender *Anemia adiantifolia* was abundant in the dry habitat. At Black Point Creek, nine common species of ferns and *Psilotum nudum* were found inside or on the edges of a small hammock on shallow soil over pitted limestone. New to the list were *Campyloneurum phyllitidis*, on old logs and always a striking sight, *Nephro-*

lepis exaltata and *Blechnum serrulatum* on the ground, small *Phlebodium aureum* and *Vittaria lineata* on trees and logs, and in crotches on live oaks small colonies of the "resurrection fern," *Polypodium polypodioides.*

Continuing in a southwesterly direction, close to the coast, we found, near Florida City, the station from which *Trismeria trifoliata* was first collected in the United States by Ray Garrett, in February, 1953. Without prewarning, this new member of our fern flora might easily have been passed by as the common *Blechnum serrulatum* of the area, though distinguished by a darker and duller color, a more strictly erect and generally taller habit, and an elevation and a twist to the leaflets which the *Blechnum* does not have. It grew densely gregarious in association with the thicket-forming tall shrubs *Baccharis halimifolia* and *B. glomeruliflora,* on the low bank of a roadside canal in which the water, though fresh in September, would no doubt be rather heavily saline at times in the dry winter season. Where growing in partial shade, the plants reached a full 2 meters in height.

In Everglades National Park, *Thelypteris gongylodes* was noted, thrusting its erect fronds about a meter above water which must have been a meter deep. In one part of the big hammock called Paradise Key, *Anemia adiantifolia* grew plentifully in shade and to much larger size than on the pinelands, but was always sterile. *Psilotum nudum* occurred frequently on the ground in the hammock, not always where its presence might easily be accounted for by the fall, decay, and eventual disappearance of a tree on which previously it had been epiphytic. At Redland Hammock, isolated in pinelands near Homestead, most of the fern species were common ones already noted, but, growing on the vertical, pitted, moist walls of narrow, well-like sinkholes going down about 2 m. to below water-level in the lime-

stone bedrock, were small, pale *Tectaria minima* and tiny *Trichomanes punctatum*. About the edges of these sinkholes *Tectaria heracleifolia* was noted, and *Trichomanes Krausii* epiphytic very close to the ground, the latter with leaves less than 2 cm. long, but exceeding those of its congener. Well-grown *Adiantum tenerum* was a common ground fern in the hammock.

In broad terms, subject to the exceptions of any general statement, the common ferns of Florida may be said to be a few hydrophytes and those species best able to withstand a degree of drought through a lengthy dry season, whereas the rare ones are inhabitants of permanently moist and sheltered niches. The shaded, secluded small sinkholes of Redland Hammock well illustrate one type of niche occupied by rare mesophytic species. Some of the rarer epiphytes occur in the limited areas of the swamps which retain water through the long dry season extending from November through May. The potentials in epiphytic ferns of the great swamp forests of the Big Cypress, in southern Florida, would appear to have been little explored, and the best parts of these swamps have already been ruined by mechanized lumbering operations of the most destructive kind. Perhaps there is some truth in the allegation that botanists, as a group, are averse to getting their feet wet!

On September 3 a reasonably early start was made on the 300-mile drive from Miami to the west coast at Clearwater. The first 80 miles were across the monotonous expanses of the Everglades to Lake Okeechobee, near which, on the mucky edges of roadside ditches between South Bay and Clewiston, *Acrostichum danaeifolium* formed magnificent colonies up to fully 3 m. tall. Having been invited to lunch at the Archbold Biological Station, on a side road between Hicoria and Childs, we left U. S. 27 at Venus and stopped awhile to botanize

at Bootheel Creek. Here in sandy flatwoods of especially well-grown young slash-pine, *Thelypteris palustris*, *T. unca*, and *Anchistea virginica* grew upright in dense mixed stands edging the sluggishly-flowing brownish water.

At Arcadia we found Ray Garrett, the well known amateur botanist, waiting in his jeep and ready to take over the leadership from this point and place his exceptionally good knowledge of the ferns and fern localities of south Florida at our disposal. The first thing he showed us was an extensive colony of *Diplazium esculentum*, both pinnate and bipinnate, and 1 to 2 m. tall, overrunning a narrow live-oak hammock on the bank of a little creek about two miles north of Arcadia, and apparently naturalized. There was a nursery garden nearby, from which the fern may have escaped. Very small sterile plants of *Ophioglossum tenerum* were found in sandy low pineland near the hammock.

At Fort Meade, Miss Mary Singeltary and Mrs. Singeltary joined the party and we left the main highway to examine the banks of the Peace River, a mile or so to the east. Here sweet gums in the riverine hammock indicated climatic conditions changing toward the temperate, and on miry seepage-wet ground *Thelypteris reducta*, prostrate, delicate *Selaginella apoda*, and the very beautiful rare *Thelypteris panamensis* made their first appearance.

From near Tampa, a diversion was made to the vicinity of Balm, especially to see *Dicranopteris flexuosa*, found there in May of this year by Ray Garrett. It grows plentifully on the sandy, partly mucky low banks of a roadside ditch close to a stream in scrubby pineland, associated with *Osmunda regalis*, *O. cinnamomea*, *Blechnum serrulatum*, *Pteridium latiusculum* var. *pseudocaudatum*, *Lycopodium cernuum*, and *L. carolinianum*. Near at hand, in moist sandy glades among saw-palmet-

tos, were *Lycopodium adpressum* and *L. alopecuroides*, while in sand scrub on an adjoining ridge xerophytic *Selaginella arenicola* occurred commonly in small bluish-gray tufts often cropped short by grazing cattle or other animals.

From Clearwater, where we stayed in motor courts, our route on the 4th was approximately north, first along U. S. 19, then, from Brooksville, on U. S. 41 to Gainesville. Our first stop was some 15 miles from Clearwater where *Litobrochia tripartita*, a very big, conspicuous fern which we had not been able to find farther south, grew in a semi-swampy hammock. Approaching Brooksville, we came to the "Oligocene Island" limestone region of the northwestern part of peninsular Florida, the area in which the St. John brothers lived and thoroughly explored for ferns. Three or four miles west of the town, *Thelypteris dentata* attracted attention on the edge of a side road, in the subtemperate deciduous forest of the area to which the term hammock hardly seems applicable. *Ophioglossum Engelmannii* occurred plentifully under young red cedars (*Juniperus silicicola*) on clayey ground in an old rock pit.

At Bassett Spring, about a mile north of Brooksville, robust *Thelypteris setigera* figured prominently in hammock edge vegetation, well illuminated, and kept moist by the spring. From there we passed on to the highlights of the day, furnished by excursions into the great Annuttalagga Hammock, which we entered in several places 8 to 10 miles north and northwest of Brooksville. Ground ferns of the woods included previously unseen *Thelypteris ovata* and *T. tetragona*. One spot of special interest was a dry gully in woods or hammock so well shaded that there was little to attract hungry cattle and therefore good botanizing for floor plants. In the gully, *Adiantum tenerum* grew taller (up to 60 cm.) but less abundantly than in Redland Hammock. Tufted under

thin underbrush on low clay banks, and mostly common, were *Thelypteris versicolor*, *Blechnum occidentale*, *Polypodium pectinatum*, *Asplenium platyneuron*, and *A. heterochroum*. In another part of the hammock, where the predominant oaks formed a thinner and less complete canopy, and shade-loving grasses were grazed short by cattle, there were many small outcrops of whitish limestone on which the most characteristic plant was fleshy, aromatic *Peperomia humilis*. Though unexpected, it was not surprising to find this tropical element in an area long known to be a holdout of tropical ferns found only here in the United States, or also in the Pleistocene limestone area of the distant Miami coast, or apparently endemic here and by relationships considered tropical in origin. Our special find in the neighborhood was *Trichomanes Petersii*, very small, and matted with bryophytes close to the ground on only one rock. Small plants of *Polypodium plumula* were rather common on other low limestone outcrops. Terrestrial, and plentiful in one place beside low rocks in the woods was *Pteris cretica* var. *albolineata*, variegated white and green and growing low to the ground.

The last stop was Gainesville, where we arrived late in the day to register at the University of Florida for the AIBS conference. Twice three-and-a-half days would have been necessary to examine at all satisfactorily, just for the special interests of our small party, the narrow strip of territory we had attempted to sample on approximately 470 route miles from Everglades National Park to Gainesville. Hurried as our reconnaissance had been, and without in the beginning a leader well enough familiar with the ferns and the territory, it had given a view of all the major habitats with the exception of some types of freshwater swamp forest and some communities of the littoral strip. According to my tally, which may not be complete, 57 species of ferns and fern-allies were met with.—L. J. BRASS.

PROSPECTIVE FIELD-TRIPS AND MEETINGS IN 1955.—A mimeographed schedule of trips was mailed in January to all members. Additional copies are available from Dr. Benedict. The fern-spore symposium is attracting interest; it has been decided to hold this meeting in the morning June 4; further information from Miss Clara Hires, 1152 Glen Ave., Millburn, N. J. The date of the New England meeting has been changed to July 15–17; a detailed prospectus is available on application to Dr. Allison. The major trip of the season will be to the Bruce Peninsula, Ontario, to view the hart's-tongue and other rare ferns of that area under the leadership of Dr. Soper. This trip will immediately precede the annual meeting of the Society at Michigan State College, East Lansing, Michigan, in early September. Members are urged to deliver papers at the annual meeting. Titles should be sent soon to Dr. Irving Knobloch, Michigan State College, or to Dr. W. H. Wagner, Jr., University of Michigan.

FERN GARDEN OPEN.—Our member Mrs. Maynard Hammond (Box 222, Sparrowbush, N. Y.) extends an invitation to any one interested in ferns to visit her estate, located about six miles from Port Jervis. A garden of 35 species of ferns is to be seen and a tract of 84 acres may be explored. June is indicated as the best month.

EXCHANGE INVITED.—Our member Robert E. Diroky, 1168 E. 78th Street, Kansas City, Missouri, is interested in exchanging seeds, bulbs, and fern spores of wild and cultivated plants.

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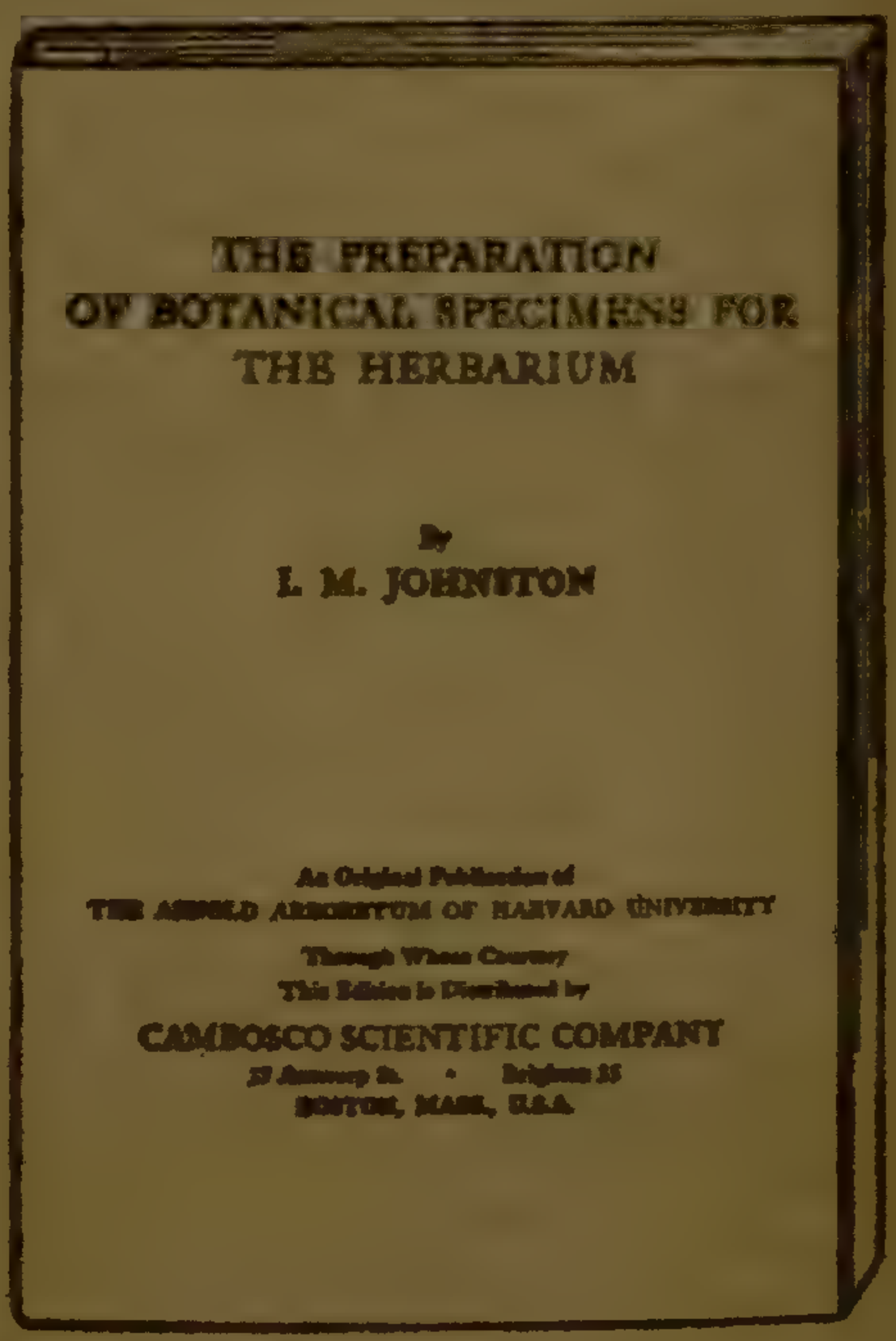

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R. C. BENEDICT IRA L. WIGGINS

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American Fern Journal

VOL. 45 APRIL–JUNE, 1955 NO. 2

The Most Fundamental Discovery About Ferns

R. C. BENEDICT

The decade of the nineteen-fifties is an appropriate period for the recognition of the most important researches and discoveries ever made about ferns, those of a man whose major reports, published in 1851, were followed by supplementary studies during that decade. It is a matter of wonder that this work was carried on by a man whose formal schooling, finished at the age of fourteen years, did not even include the usual German Gymnasium years, let alone any tutelage at an institution of higher learning or under any recognized botanical leader. Moreover, his studies were accomplished after hours of employment in a bookselling firm, and under the handicap of extreme near-sightedness. Notwithstanding these obstacles, his epoch-making contributions relating to ferns were brought to a conclusion and published by the time the worker was twenty-seven years of age. Furthermore, they had been preceded by his important discoveries and publications relating to fertilization and seed-formation in flowering plants.

The author mentioned was Friedrich Wilhelm Benedikt Hofmeister, born in 1824, the son of a self-made business man. The title of his major contribution, rendered in English,[1] was "Comparative Researches on the Germination, Development and Fruit Formation of the Higher Cryptogams (Mosses, Ferns, Equisetaceae, Rhi-

[1] H. M. Bower, translator, of Karl von Goebel's biography of Wilhelm Hofmeister. Leipzig. 1923. The English translation was published in 1926 by the Ray Society, Dulau & Co., London.

[Volume 45, No. 1, of the JOURNAL, pp. 1–56, was issued March 28, 1955.]

zocarpaceae and Lycopodiaceae) and the Seed Formation in the Conifers." Before 1851, ferns and other pteridophytes—and seed plants might well be included—had been really "cryptogams," that is, plants with hidden and undiscovered reproductive processes. Although a considerable number of discoveries had been made before 1851—e.g., that spores grow into prothallia, that these bear archegonia, and so forth—the complete reproductive process had not been described in ferns or other pteridophytes, nor the full details of what takes place in bryophytes, let alone the comparable behavior in conifers. Hofmeister not only brought to light the details on which our present understanding of these processes is based, but his summary generalization was expressed in language so clear that it might easily be used in the most elementary botanical account. In Bower's translation it reads: "Mosses and ferns offer accordingly one of the most striking examples of regular alternation of two generations, the first, proceeding from the germinating spore develops antheridia and archegonia, which vary in point of numbers. In the central cell of the archegonium and consequent on fertilization by spermatozoids voided by the antheridia, there arises the second generation. This second generation is destined to produce spores, whereof it always forms a far greater number than that of the incipient fruits borne by the first generation."

The advance in knowledge which this simple generalization represented can only be realized in the light of the many misconceptions that were prevalent before its announcement, some of them in the form of *obiter dicta* by dogmatic leaders like Schleiden. Its breadth of application may be further appreciated when it is realized that by "mosses" Hofmeister referred to liverworts as well, and by the further recognition that he also made clear the details of what we now consider the homologous se-

quence of generations in the conifers. While these researches constitute Hofmeister's major contribution, the rest of the sixth decade saw further reports, including descriptions of the prothallia of *Botrychium, Equisetum,* and a study of *Isoëtes.* Later years also saw the publication of texts dealing with plant development in general and with plant physiology, all completed in a life which ended in his fifty-third year in 1877.

Hofmeister's studies were a part of the tidal wave of biological studies and discoveries which followed the joint announcement of the Cell Doctrine by Schleiden in 1838 and Schwann in 1839. While Hofmeister had not received any formal tutelage in the field of plant study, he had had early stimulation from the interest of his father, who maintained a fair-sized botanical garden as a hobby. At first, young Hofmeister had devoted his time chiefly to collecting and studying insects, but after association with the orchid student Reichenbach, he turned to plants. In place of classwork and lectures, he gained his basic knowledge and perspective in the field of botanical problems from readings in Schleiden, von Mohl, and others. His own original studies began before he was twenty years old. According to Goebel, even his near-sightedness was turned to advantage, for it made it possible for him to examine and dissect accurately very small structures.

Despite his background, the fundamental importance of Hofmeister's work was quickly recognized and led to offers of university professorships, something unheard of in the hierarchical world of university life of the time. In 1863, he accepted a call to a professorship at the University of Heidelberg. Incidentally, in the preliminary consideration of qualifications desired for the position, the University authorities concluded that either Julius Sachs or Anton deBary, two botanical giants of that

day, were suitable possibilities. The choice fell on Hofmeister after it had been learned that these other men, whose standing today is no greater than Hofmeister's, would require too large a stipend as compared with the metamorphosed book-seller.

Since Hofmeister's time, ferns and other pteridophytes have occupied a fundamental place in botanical studies which seek to discover the ancestry and path of developments of flowering- and seed-plants in general. Not only among living ferns, but increasingly among their predecessors of earlier geological periods over a stretch of some five hundred million years, thousands of pages of research reports have been published in the years since Hofmeister first made clear the basic pattern of the life history of the successful land plant divisions. From the account by Goebel, one of Hofmeister's students, may be taken one final interesting comment which points up Hofmeister's genius: "And in this connection, we may perhaps point out how much botany is indebted to those very investigators who were not professional botanists. Let us mention only K. F. Wolff, Ingen-Housz, A. v. Humboldt, Gärtner, T. A. Knight, Hofmeister, Darwin, and Mendel."

Aids to Spore Culture

R. C. BENEDICT

Many people are successfully raising ferns from spores these days. The Fern Journal, over the years, has carried a number of articles on the subject, the most recent being that by Dr. Walter Kleinschmidt in 1952.[1] The present note is not intended as a complete account but merely to call attention to two adjuncts which may be found helpful.

[1] Growing Ferns from Spores. This JOURNAL **42**: 117–124. 1952.

Fluorescent light is widely known for its value in plant culture. Although ferns are thought of as usually preferring shade, fern spores require a certain minimum of light for germination. Fluorescent light can provide both an adequate total amount and a favorable range of the spectrum, and also its use avoids the difficulty of too much heat which the ordinary filament-lamp gives. Fluorescent light also makes possible the raising of ferns in the darkest part of the house.

The illustration shows the fluorescent-light plant-box used by Mr. M. D. Mann, Jr., Treasurer of the Fern Society until his death in 1953. Mr. Mann was successful in raising a large variety of hardy fern types. Most recently, he had brought to maturity a culture of hart's-tongue, raised from spores from Jamesville. Started in the fall of 1952, some of the plants reached fruiting maturity by midsummer of last year.

The box was constructed of an asbestos board not subject to decay. The bottom was covered with a layer of vermiculite as a moist base in which the small pots of spore cultures were set. The inverted bottle provided a constant drip of water, and a trace of potassium permanganate in the water kept down fungus growth. The box was kept in the cellar.

The fluorescent light was kept on at least 20 hours each day. In nature, the small proportion of fern spores which land in favorable situations of soil and moisture find their growth interrupted by the nightly advent of darkness and even more by the decrease of light in fall and by the drop in temperature during the winter. Given a chance, young plants will continue to grow and increase in size throughout the entire year. Whether different fern species manifest preferences for different day-lengths, such as have been found by the photoperiodicity studies with seed-plants, is not known to the writer. It can be reported, however, that the spore cul-

Fluorescent Box for Spore Culture

tures of several common ferns have demonstrated a capacity to grow, thrive, and develop the leafy stage under continuous 24-hour lighting over a period of close to six months, e.g., the osmundas, *Acrostichum danaeifolium*, *Onoclea*, and species of *Dryopteris*.

The Fern Journal is indebted for the illustration of Mr. Mann's plant-box to Mrs. Dorothy Sterling and Mr. Myron Ehrenberg, who are collaborating on a book on flowerless plants, designed for children and due to be published by Doubleday Company. It may be stated here that it has a good chapter on ferns.

One adjunct for fern spore culture is the easily obtainable transparent plastic boxes sold in various shapes and sizes as "crispers" for refrigerator use. I have made initial use of a kind with the trade name of "Freez'rware," made by the Tri-State Plastic Company of Henderson, Kentucky, which is readily available from hardware and department stores generally. Constructed of the Dupont plastic styron they are highly transparent, and may be sterilized in boiling water. Advantages, compared to pots and glassware, are their lightness and less danger of breakage. The covers are tight and not liable to dislodgement. As tried experimentally, to date, I have used boxes of various sizes with a variety of planting media: inverted pots and pieces of pot over moist sphagnum, small chunks of osmunda fiber, and soil on a base of vermiculite in pots. The covers are tight enough so that little moisture is lost by evaporation. For some species this may constitute an adverse factor, especially if too much water is used at the start. It can be reported, however, that thriving cultures have been obtained on all the media with several different fern species. At the same time, it must be noted that in some of the plastic containers, no growth was obtained, but failure may have been due to some other factor—too little light, or chance exposure to too much heat. These

first cultures were carried on under natural lighting, under a porch roof, out of doors. The containers could, however, be easily set up in a dark corner of a room or in a cellar, with fluorescent light providing illumination. The boxes range in size from three inches square to the largest "crisper" size of ten by thirteen inches, a size which could easily hold a dozen or more small pot cultures embedded in moss or vermiculite, each with its particular kind of fern spore.

Marsilea quadrifolia in Missouri

L. J. GIER

On October 11, 1953, we found *Marsilea quadrifolia* L. growing in abundance at Basswood Lakes, Platte County, Missouri ($NE\frac{1}{4}$ Section 27, Tier 53 North, Range 34 West). It was fruiting heavily. We collected a quantity of material, which has been distributed to various herbaria. On a later date, we returned and collected many sporocarps for Dr. Paul Voth of Chicago, who was making some studies on this group at the time.

Basswood Lakes is a private fish-hatchery and commercial area for raising bass, owned and operated by Mr. A. J. Stephens, formerly of Kansas City, Missouri. Mr. Stephens has a beautiful area here with a large modern lodge in which he lives. He raises fancy roses and a few other flowers. In addition to the bass industry, he exports large quantities of *Ceratophyllum* which is abundant in the spring-fed lakes. This plant is used for mulching and for the fertilizer value of the decomposed plants. The springs feeding the lakes contain minerals and the water was formerly bottled and sold for medicinal purposes.

This is apparently the first report of this species in Missouri. We were unable to trace the origin of it here. Mr. Stephens and the local conservation agent were of

the opinion this plant was introduced here in the planting of aquatic plants some years ago. At the time of our visit, there was a strip about a meter wide and 25 to 30 meters long along one lakeshore that was practically solid with this species. Small patches of it could also be found elsewhere around the lakes.

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Notes on Michigan Pteridophytes, I. New County Records in Osmundaceae and Polypodiaceae

DALE J. HAGENAH

The flora of Michigan is rich in ferns and other pteridophytes, both in the number of species to be found and in their relative abundance throughout the state. However, comparatively little information about the distribution of individual species was available until the publication of Billington's "Ferns of Michigan" by Cranbrook Institute of Science.[1] The maps in this work contain more than 2,000 county records for the 101 entities which are mapped. Only one county (Ogemaw) is unrepresented on the maps; however, a recent analysis of these distribution records[2] shows that the ferns of many other counties are inadequately known; in fact, any county may still yield additional species.

In the past few years, pteridophytes have been assiduously collected in Michigan, both by professional botanists and by amateurs. Many of these collections are recorded on the maps in "Ferns of Michigan." However, new finds are being made each year, and to make these new records available I plan to publish them in a

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[1] Cecil Billington. Ferns of Michigan. Cranbrook Institute of Science, Bull. 32. 1952. Reviewed in this Journal, **43**: 19–20. 1953.

[2] Dale J. Hagenah. The New Michigan Flora, An Opportunity for Local Botanists. Asa Gray Bull., N.S. **1**: 353–357. 1953.

series of articles. This first article will be confined to new records and other information in the families Osmundaceae and Polypodiaceae; subsequent articles will deal with the Ophioglossaceae and with the so-called fern-allies.

Four of the recent discoveries represent significant extensions of ranges. The most important is the finding of *Phyllitis scolopendrium* var. *americana* for the first time in Michigan,[3] extending the range of this species some 190 miles north and west from the previously known limit in the Bruce Peninsula, Ontario. The station of *Asplenium platyneuron* in eastern Chippewa County is a new northern range extension. Several specimens of *Cystopteris* have been found which have the verrucose spores typical of the long-overlooked *C. dickieana*. A number of other plants of *Cystopteris* appear to be hybrids between *C. bulbifera* and *C. fragilis;* such hybrids have been reported from more southern and eastern parts of the United States but not from the Great Lakes Region.

Three species previously known in Michigan from only one county each have been found in other counties: *Asplenium viride*, previously recorded only from Chippewa County, was found in Mackinac and Schoolcraft; *Pellaea atropurpurea*, of which authentic material had been seen only from West Bluff, Keweenaw County, was found in Dickinson; and *Woodsia obtusa*, a very rare fern in this state, previously included in the Michigan list only on the basis of an old O. A. Farwell collection from Keweenaw County, was found in Dickinson and Chippewa. Other interesting finds include the first Lower Peninsula stations for *Asplenium trichomanes* and *Dryopteris filix-mas*, and the first records for *Camptosorus rhizophyllus* and *Woodsia cathcartiana* from the

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[3] Dale J. Hagenah. The Hart's-Tongue in Michigan. This JOURNAL, **44**: 2–7. 1954.

eastern part of the Upper Peninsula.

When the distribution maps were made for "Ferns of Michigan," the compilers included only records for which voucher specimens had been seen. As a result, some of the older published records were omitted due to lack of confirming specimens in the herbaria examined. Some of these older records have been confirmed either by new collections or through the location of vouchers. A few records were omitted inadvertently and will be included in these articles.

The author wishes to express his appreciation to the staff members of the Herbarium and the Biological Station of the University of Michigan for the many courtesies which they have extended, for assistance in the identification of critical specimens, and for the many records which they have made available for publication here. Many thanks are due to Mr. Robert Halbeisen of Detroit for a fine series of specimens which he recently presented to Cranbrook Institute of Science so that the numerous new records might be included in this list. Also, especial thanks are due to Mrs. Margaret Jenkins of Dimondale, Michigan, for directions to localities in Barry County where a number of interesting finds were made.

The nomenclature employed is that of the Eighth Edition of Gray's Manual (1950), the same as that in "Ferns of Michigan." Where no collector's name is cited, the collections are those of the author. Collections cited as W. & H. are joint collections by Dr. W. H. Wagner, Jr., of the University of Michigan, and the writer. Those cited as H. & H. are joint collections by Dr. Marion T. Hall, of Cranbrook Institute of Science, and the writer. Unless otherwise cited all collections are deposited in the Cecil Billington Herbarium of the Cranbrook Institute of Science, Bloomfield Hills, Michigan.

OSMUNDACEAE

OSMUNDA REGALIS L. var. SPECTABILIS (Willd.) Gray. DELTA: Near head of Big Bay de Noc, 2647; HURON: South of Harbor Beach, *H. & H.* 201; MONTMORENCY: East of Vienna, 2727; OSCODA: South of Mio, 2755; OTSEGO: East of Gaylord, 2696; PRESQUE ISLE: Near outlet of Grand Lake, *H. & H.* 270; TUSCOLA: Near Millington, 2801.

OSMUNDA CLAYTONIANA L. BARRY: Near Pine Lake, Hope Township, *W. & H.* 90; OSCODA: South of Mio, 2759.

OSMUNDA CINNAMOMEA L. ALGER: South of Wetmore, 3174; HURON: South of Harbor Beach, *H. & H.* 170; Iosco: West of Oscoda, *H. & H.* 366; Near Au Sable Point, *Halbeisen,* July, 1951; IRON: Northwest of Iron River, 2955; MONTMORENCY: East of Vienna, 2720; OGEMAW: East of West Branch, 2789; OSCODA: South of Mio, 2753; OTSEGO: East of Gaylord, 2698.

Aberrant Forms: Leaf forms which are more or less intermediate between typical sterile and typical fertile conditions are not infrequent in all three species of *Osmunda* in Michigan. *O. cinnamomea* forma *frondosa* (T. & G.) Britt. is the most showy of such forms, especially when the fertile pinnae are set at a wide angle to the rachis more like sterile pinnae. Probably the most common in Michigan is the form of the Royal Fern in which foliaceous pinnules bearing a few sporangia along the edge occur in the fertile portion of the frond. This has been dignified with the name forma *anomala* (Farw.) Harris, although the significance of this form seems doubtful since foliaceous pinnules may occur on one frond but not on others on the same plant. It is interesting to note that British books on ferns, such as those by Lowe and Moore, illustrate such a condition in the European plant without giving it a name although they give hundreds of names for minor forms in other species. In *O. claytoniana,* occasional fronds show a condition in which some fertile pinnae are somewhat foliaceous. Such fronds have been observed in a number of Michigan colonies of this fern. No name has been found for this form in the literature. However, until it is shown to

be more than a mere teratological form of a kind which occurs in ferns such as *Onoclea* and *Matteuccia* as well as in *Osmunda*, it is better that it remain nameless.

POLYPODIACEAE

WOODSIA ILVENSIS (L.) R. Br. HOUGHTON: Silver Mountain, south of Alston, 3149; IRON: Horse Race Rapids of the Paint River, 1235.

The Rusty Woodsia has now been recorded from all of the western counties of the Upper Peninsula.

WOODSIA CATHCARTIANA Robins. HOUGHTON: Big Limestone Mountain, northeast of Alston, 3213; MACKINAC: Crevices in dolomite pavement, north of Ozark, *Rogers McVaugh* 12769 (MICH) and *Donald F. M. Brown* 633 and 634 (personal collection); MARQUETTE: Crevices in bluff overlooking Lake Superior, Presque Isle Park, City of Marquette, 3246, where it was first found by Dr. Clair A. Brown during the 1953 Northern Michigan Foray of the American Fern Society.

As noted in "Ferns of Michigan" there is considerable disagreement as to the proper identification of the Michigan Woodsias having non-articulated stipes. A cytotaxonomic study of the genus as represented in the Great Lakes region has been undertaken by Mr. Donald F. M. Brown of the University of Michigan. Pending the completion of his work, I consider it preferable to assign all material of the *W. oregana-cathcartiana* complex to the one entity.

WOODSIA OBTUSA (Spreng.) Torr. DICKINSON: Crevices in bluff north of Norway, 2193; CHIPPEWA: Crevices in dolomite pavement, north of Caribou Lake, *H. & H.* 650.

Although W. J. Beal in his "Michigan Flora" (1904) said "Not rare," the Blunt-Lobed Woodsia has proved to be one of Michigan's rarest ferns. With the exception of one early collection from Keweenaw County (*O. A. Farwell* 712), all previous records have been found to be erroneous. A specimen of the C. K. Dodge collection from Marquette, located in the herbarium of Wayne

University, Detroit, proved to be *W. ilvensis*, and the C. A. Davis specimen (MICH) from Port Austin, Huron County, belongs to the genus *Cystopteris*. The Keweenaw locality has not been relocated, and only an occasional plant was found at the Chippewa station.

CYSTOPTERIS FRAGILIS (L.) Bernh. ALPENA: Limestone sinks, south of Leer, 2493; BARRY: In woods southwest of Hastings, *W. & H.* 104; LUCE: Bluff in woods north of Hendricks Quarry, 3207.

In "Ferns of Michigan" this polymorphic and widely-distributed species was mapped as a species-complex. Some Michigan specimens have been found to have spores which are verrucose, rather than echinate. Such plants are now referred to *C. dickieana* Sim by Alston[4] and other workers. Collections made in 1950 by Drs. Rogers McVaugh and C. E. Wood, Jr. on Drummond Island, Chippewa County (*McVaugh* 11360), and by the author on Mt. Bohemia, Keweenaw County (no. 2001), were the first in which this character was recognized. Spore examinations of all Michigan collections called *C. fragilis* in the herbaria of the University of Michigan and Cranbrook Institute of Science have disclosed three additional stations for the form with verrucose spores.[5] The Mt. Bohemia station was revisited in 1952 and 1953, and it was found that the plants on one bluff overlooking Lac La Belle consistently produced the verrucose spores. Live plants from this station have been transferred to the University of Michigan Botanic Gardens for further investigation to determine if the Michigan plants are identical with the European *C. dickieana*. To date no field character has been found which will enable one

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[4] This JOURNAL **41**: 76. 1951.

[5] HURON: Sandstone rocks at Port Austin, *C. A. Davis*, July 28, 1896 (MICH), originally labeled as *Woodsia obtusa*; KEWEENAW: Cliff Mine, near Phoenix, 3046; and MARQUETTE: Partridge Island, Lake Superior, *A. Dachnowski*, July 15, 1906 (MICH).

to distinguish readily the plants with verrucose spores from the variable plants with echinate spores.

CYSTOPTERIS BULBIFERA (L.) Bernh. ALCONA: North of Harrisville, 2454; ALPENA: Limestone sinks, south of Leer, 2497; CHIPPEWA: On Drummond Island, *McVaugh* 11355, and on the mainland, near Trout Lake, *H. & H.* 888; CLINTON: Near Hubbardston, *Halbeisen*, Sept. 1949; DICKINSON: Near Menominee River south of Norway, 2899; GOGEBIC: At waterfall near mouth of Presque Isle River, 1203; HOUGHTON: West Canal Road, west of Houghton, *C. D. Richards* 2251 (MICH); LUCE: Near Upper Tahquamenon Falls, *McVaugh* 11460 (MICH); SANILAC: Near Lake Huron south of Port Sanilac, *H. & H.* 142.

CYSTOPTERIS BULBIFERA × FRAGILIS. A supposed hybrid fern resembling *C. fragilis* in general aspect but with very large sori and bearing scaly bulblets near the axils of one or more of the lower pinnae was found on a moist rock wall at one of the waterfalls near the mouth of the Presque Isle River, Gogebic County, in 1949. The station was revisited in 1950 and 1952 and similar plants were found on both occasions. At this station both of the supposed parent species are present. However, material with similar bulblets has been found near Trout Lake (Chippewa County), Fayette (Delta County), Felch (Dickinson County), and Hubbell (Houghton County), growing with *C. fragilis* but without any plants of *C. bulbifera* in the immediate vicinity. During the study of *C. fragilis* as represented in the herbarium of the University of Michigan one additional specimen was found which had been collected near Norway (Dickinson County) by C. A. Davis in 1892. All six stations are far north of the supposed range of *C. tennesseensis* Shaver [*C. fragilis* var. *tennesseensis* (Shaver) McGregor]. Although the northern material may represent a major extension of range for that entity, I do not believe that the Michigan plants should be assigned to it without further study.

MATTEUCCIA PENSYLVANICA (Willd.) Raymond. ALPENA: Limestone sinks, south of Leer, 2495; ANTRIM: North of Mancelona, *W. H. Wagner* 8091; DICKINSON: West of Felch, 1240; EATON: Grand Ledge, *B. A. Walpole* 1458; OTSEGO: South of Vanderbilt, *Wagner* 8059.

The name *Pteretis*, used in Gray's Manual, was rejected at the Paris Congress in 1954 and the name *Matteuccia* conserved.

ONOCLEA SENSIBILIS L. IOSCO: Northeast of East Tawas, *H. & H.* 302; Near Au Sable Point, *Halbeisen*, July, 1951; MONTMORENCY: East of Vienna, 2732; OSCODA: South of Mio, 2752; OTSEGO: East of Gaylord, 2697.

DRYOPTERIS. This generic name was used in the broad sense by M. L. Fernald in the revision of Gray's Manual, but in the New Britton and Brown Illustrated Flora (1952) *Dryopteris* has been divided into three genera by C. V. Morton. All three genera, *Thelypteris*, *Gymnocarpium*, and *Dryopteris* (sensu Morton), are found in Michigan. The species of the first two are usually readily identifiable in the field although the two species of *Gymnocarpium* are sometimes troublesome in herbarium specimens. However, in *Dryopteris* proper there are numerous specimens which are difficult to place. Are they hybrids or is the range of variation within some species imperfectly understood? Recent investigations in the cytology[6] and spores[7] of the genus have thrown new light on some entities. Manton and Walker have shown that *D. boottii* and *D. spinulosa* var. *fructuosa* are hybrids, both (in Michigan material) showing a triploid condition with some unpaired chromosomes. *D. clintoniana* was shown to be a hexaploid, as inferred by Morton,[8] and the spores confirm its distinctness from

[6] I. Manton and S. Walker. Cytology of the *Dryopteris spinulosa* complex in Eastern North America. Nature **171**: 1116. 1953.
[7] Fern Ward Crane. Spore Studies in *Dryopteris*, I. This JOURNAL **42**: 159–169. 1953.
[8] This JOURNAL **40**: 219. 1950.

D. cristata. Further study along these lines is needed, and some of it is now in progress. For the present I shall confine the listing of additional records to those entities which appear to be self-perpetuating species, leaving the hybrids for treatment when more definite information is available. Where they differ from those in Gray's Manual, the names used in C. V. Morton's treatment are given in brackets.

DRYOPTERIS THELYPTERIS VAR. PUBESCENS (Lawson) Nakai [*Thelypteris palustris* var. *pubescens* (Lawson) Fernald]. ALPENA: Near Misery Bay, east of Alpena, 2304; DICKINSON: Near Menominee River, south of Norway, 2907; HURON: Sand Point, Saginaw Bay, *McVaugh* 12457; Near Lake Huron south of Harbor Beach, *H. & H.* 160; IOSCO: South of Oscoda, 2362; Near Au Sable Point, *Halbeisen*, July, 1951; MONTMORENCY: East of Vienna, 2728; OGEMAW: East of West Branch, 2787; OSCODA: South of Mio, 2746; OTSEGO: East of Gaylord, 2695; TUSCOLA: Near Millington, 2803.

DRYOPTERIS NOVEBORACENSIS (L.) Gray [*Thelypteris noveboracensis* (L.) Nieuwl.]. BARRY: Northwest of Pine Lake, Hope Township, *W. & H.* 96; EATON: North of Vermontville, *Halbeisen*, Sept., 1951; JACKSON: Northwest of Waterloo, 3224.

DRYOPTERIS PHEGOPTERIS (L.) Christens. [*Thelypteris phegopteris* (L.) Slosson]. ALCONA: North of Harrisville, 2461; DICKINSON: Near Felch, 3924; EMMET: Bay View, *Stuart E. Knappen*, July, 1892 (AQUINAS COLLEGE); LUCE: Upper Tahquamenon Falls, *McVaugh* 11473; Near McMillan, *Wagner* 8079.

DRYOPTERIS HEXAGONOPTERA (Michx.) Christens. [*Thelypteris hexagonoptera* (Michx.) Weatherby]. BARRY: Northwest of Pine Lake, Hope Township, *W. & H.* 95.

In "Ferns of Michigan" this species was recorded from Keweenaw County on the basis of an O. A. Farwell collection. The preceding species was recorded for Oakland County on the basis of another Farwell collection. No confirming collections by other botanists are known. It would seem that these two records, each far from the normal range of the species, may possibly be due to an accidental interchange of specimens by their collector.

DRYOPTERIS DISJUNCTA (Ledeb.) Morton. [*Gymnocarpium dryopteris* (L.) Newman]. ALPENA: Woods near limestone sinks, south of Leer, *W. & H.* 67; ANTRIM: Central Lake, *George L. Fisher*, July 12, 1904; HURON: South of Harbor Beach, *H. & H.* 186: IOSCO: Northeast of East Tawas, *H. & H.* 303; Near Au Sable Point, *Halbeisen*, July, 1951; MONTMORENCY: East of Atlanta, 2738; OGEMAW: East of West Branch, 2776; OSCODA: South of Mio, 2762; OTSEGO: South of Vanderbilt, *Wagner* 8058.

DRYOPTERIS SPINULOSA (O. F. Muell.) Watt. (Typical) [*D. austriaca* var. *spinulosa* (Muell.) Fiori]. ALPENA: Limestone sink, south of Leer, *W. & H.* 58; ARENAC: Near Au Gres, *Halbeisen*, July, 1951; BARRY: Northwest of Pine Lake, Hope Township, *W. & H.* 93; IOSCO: Near Au Sable Point, *Halbeisen*, July, 1951; IRON: North of Kiernan, 2950; MONTMORENCY: East of Vienna, 2724; MUSKEGON: Near Duck Lake, *Halbeisen*, Aug., 1949; OGEMAW: East of West Branch, 2782; ONTONAGON: Near mouth of Union River, 1151; OTSEGO: East of Gaylord, 2718; South of Vanderbilt, *Wagner* 8055.

DRYOPTERIS SPINULOSA var. INTERMEDIA (Muhl.) Underw. [*D. austriaca* var. *intermedia* (Muhl.) Morton]. ALCONA: North of Harrisville, 2449; Southeast of Curtisville, *H. & H.* 437; ALPENA: Woods at limestone sinks, south of Leer, 2489; ARENAC: Near Whitestone Point, *Halbeisen*, July, 1951; BARRY: Northwest of Pine Lake, Hope Township, *W. & H.* 92; CLINTON: Near Hubbardston, *Halbeisen*, Sept., 1949; IOSCO: Near Au Sable Point, *Halbeisen*, July, 1951; MONTMORENCY: East of Vienna, 2719; OGEMAW: East of West Branch, 2773; OTSEGO: East of Gaylord, 2716; South of Vanderbilt, *Wagner*, 8054.

The cytological findings by Manton and Walker indicate that this fern is a diploid with the chromosome number n = 41 while *D. spinulosa* (typical) is a tetraploid (n = 82). The spores of variety *intermedia* have been shown to be distinctly different from those of *D. spinulosa* (typical). In view of these findings our most common woodfern should probably be considered as a species under the name *D. intermedia* (Muhl.) Gray.

DRYOPTERIS CRISTATA (L.) Gray (Typical). ALCONA: Southeast of Curtisville, *H. & H.* 433; ARENAC: Whitestone Point, *Halbeisen*, July, 1951; BARRY: Near Glass Creek, Hope Township, *W. & H.* 113; CHEBOYGAN: Near Burt Lake, *J. H. Ehlers* 1577

(MICH); Near Duck Lake, *Wagner* 8027; DICKINSON: Near Menominee River, south of Norway, 2906; EATON: North of Vermontville, *Halbeisen*, Sept. 1951; GOGEBIC: West of Watersmeet, 2609; HURON: South of Harbor Beach, *H. & H.* 190; ISLE ROYALE: Tobin Harbor, *C. A. Brown* 3344 (MICH); IOSCO: South of Oscoda, *Halbeisen*, July, 1951; KENT: Ada Township, *C. W. Bazuin* 1996; LEELANAU: Near Lake Leelanau, *P. W. Thompson* L-237; LUCE: Near McMillan, *Wagner* 8080; MARQUETTE: Near Negaunee, *C. K. Dodge*, July 6, 1916 (MICH); Shot Point on Lake Superior, 2079; MONTMORENCY: East of Atlanta, 2739; OGEMAW: East of West Branch, 2781; OSCODA: South of Mio, 2758; OTSEGO: South of Vanderbilt, 3288; OTTAWA: Near Holland, *C. H. Kauffman*, Aug. 1, 1910 (MICH); North of Holland, *S. A. Cain*, Aug., 1950; ST. CLAIR: Near Port Huron, *C. K. Dodge*, June 24, 1896 (MICH).

DRYOPTERIS CRISTATA var. CLINTONIANA (D. C. Eaton) Underw. [*D. clintoniana* (D. C. Eaton) Dowell.] CHEBOYGAN: Near Burt Lake, *Wagner* 8049; EMMET: West of Carp Lake, *Wagner* 8068; JACKSON: West of Waterloo, *W. & H.* 31a; OTSEGO: South of Vanderbilt, *Wagner* 8057.

Prior to the collections made by Dr. W. H. Wagner, Jr., in 1952 in the three counties near the University of Michigan Biological Station at Douglas Lake, there were no records for Clinton's Shield Fern north of the center of the Lower Peninsula. There is considerable field evidence that, in Michigan, this fern is a fertile, self-perpetuating species (*D. clintoniana*) which frequently hybridizes with other shield ferns.

DRYOPTERIS FILIX-MAS (L.) Schott. ALPENA: Limestone sinks south of Leer, *W. & H.* 54.

The Alpena station is the first known locality for typical *D. filix-mas* in the Lower Peninsula. However, through the kindness of Dr. C. L. Gilly, of Michigan State College, I have examined a specimen collected by Mrs. Margaret Jenkins in 1940 near Pine Lake, Hope Township, Barry County, in the southwestern part of the Lower Peninsula. This frond was referred to *Thelypteris filix-mas* by Mrs. Jenkins because it had an

abundance of the two types of scales found in *D. filix-mas* and because its sori were restricted to the upper part of the frond and to the lower part of each pinnule. However, the frond is firmer in texture, has the sori closer to the margin than to the mid-vein, and in the shape of the pinnae and general aspect suggests *D. filix-mas* × *marginalis*. Examination of the sporangia showed an apparent failure to develop any perfect spores. Only one plant was found by Mrs. Jenkins, and if that one should be a natural hybrid, its existence there raises interesting questions as to the possible source of the spores. The Marginal Fern has not been seen from Barry County, although it is known in all of the surrounding counties. The closest known station for the Male Fern, even as a cultivated plant, is fifty miles away. Unfortunately, the woods where Mrs. Jenkins made her discovery have been partially lumbered over since that time although they have not been cleared. Recent attempts by Mrs. Jenkins and by Dr. Wagner and myself to relocate the station have been unsuccessful.

DRYOPTERIS GOLDIANA (Hook.) Gray. Limestone sink areas south of Leer, 2494; ANTRIM: North of Mancelona, *Wagner* 8089; BARRY: Near Glass Creek, Hope Township, *W. & H.* 98; EATON: North of Vermontville, *Halbeisen*, Sept., 1951.

DRYOPTERIS MARGINALIS (L.) Gray. ALCONA: North of Harrisville, 2458; Southeast of Curtisville, *H. & H.* 443; ALPENA: Limestone sink area south of Leer, 2487; BARAGA: West part of Huron Mountains, *C. D. Richards* 2347 (MICH); CHIPPEWA: Rockview, south of Pickford, 2531; Near Caribou Lake, *W. & H.* 52a; On Drummond Island, *McVaugh* 11369; IRON: Michigamme Mountain, 2939.

DRYOPTERIS FRAGRANS var. REMOTIUSCULA Komarov. MARQUETTE: Ishpeming, *A. Dachnowski*, Aug. 25, 1906 (MICH); Cliffs at north side of Lake Michigamme, 2576.

POLYSTICHUM BRAUNII var. PURSHII Fernald. BARAGA: East of Three Lakes, 3167.

POLYSTICHUM ACROSTICHOIDES (Michx.) Schott. BARRY: Near Glass Creek, Hope Township, *W. & H.* 88; CLINTON: Near Hub-

bardston, *Halbeisen*, Sept., 1951; EATON: North of Vermontville, *Halbeisen*, Sept., 1951; MANISTEE: Lookout Point dune area, *C. W. Bazuin* 9049.

ATHYRIUM PYCNOCARPON (Spreng.) Tidestrom. ALPENA: Limestone sinks south of Leer, *W. & H.* 55; BARRY: Near Glass Creek, Hope Township, *W. & H.* 101; Southwest of Hastings, *W. & H.* 106; EATON: North of Vermontville, *Halbeisen*, Sept., 1951; ST. CLAIR: Near Beard's Mill on Black River, *C. K. Dodge*, August 18, 1896 (MICH).

The Dodge collection from St. Clair County is believed to be the basis of the Beal's Michigan Flora report of *Woodwardia areolata* (*W. angustifolia*) from that county. Beal's listing is "Near Black River, St. Clair County, C. K. Dodge" but Dodge himself, writing at a later date, did not record such a station for the *Woodwardia*, citing only the L. H. Bailey station near South Haven. The Beal report appears to be an error in assigning the Dodge records of *Asplenium angustifolium* to the proper genus.

ATHYRIUM THELYPTERIOIDES (Michx.) Desv. ALPENA: Limestone sinks south of Leer, *W. & H.* 76; ANTRIM: North of Mancelona, *Wagner* 8090; BARRY: Near Glass Creek, Hope Township, *W. & H.* 100; Southwest of Hastings, *W. & H.* 105a; IRON: Northwest of Iron River, 2961; ST. CLAIR: West of Ruby, *H. & H.* 109; SCHOOLCRAFT: Blaney Park, *Wagner* 8077.

ATHYRIUM FILIX-FEMINA var. MICHAUXII (Spreng.) Farwell (including formae *elatius* and *rubellum*). ALPENA: Near Misery Bay, east of Alpena, 2315; Limestone sinkhole area south of Leer, *W. & H.* 63; CLINTON: Near Hubbardston, *Halbeisen*, Sept., 1949; IOSCO: Near Au Sable Point, *Halbeisen*, July, 1951; ISABELLA: East of Mt. Pleasant, 1681; MONTMORENCY: East of Vienna, 2729; OGEMAW: East of West Branch, 2786; OSCODA: South of Mio, 2743; OTSEGO: East of Gaylord, 2701.

PHYLLITIS SCOLOPENDRIUM var. AMERICANA Fernald. CHIPPEWA: Near Trout Lake, *H. & H.* 896.

Recently described in this JOURNAL, the first Michigan station for the Hart's-Tongue extends its range to a new northwestern limit near the most northern part of the Niagara formation with which it is associated in On-

tario. Rather extensive outcrops of this formation in Michigan are as yet relatively unexplored botanically.

CAMPTOSORUS RHIZOPHYLLUS (L.) Link. CHIPPEWA: Near Rockview, south of Pickford, 2538.

All records of the Walking Fern in "Ferns in Michigan" were based on collections made around the turn of the century. So far as I can learn, it was not collected in the state from about 1905 until the above cited Chippewa collection was made in 1951. During 1952, it was rediscovered in two of the counties in which it had been collected many years before. In Alpena County it was found on ledges of the walls of limestone sinks south of Leer (*W. & H.* 61), and in Dickinson County, several good colonies were found at one locality near Quinnesec (no. 2877). At the Quinnesec station two interesting finds were made, one, a colony in which all of the fronds had incised edges (no. 2878), and the other a nearly vertical, moss-covered rock wall in deep shade on which there were numerous young sporophytes, some still attached to prothallia.

ASPLENIUM VIRIDE Huds. MACKINAC: Near Ozark, *McVaugh* 12767 (MICH); SCHOOLCRAFT: North of Manistique, 2658.

The Green Spleenwort has been found to be fairly abundant south of Pickford, Chippewa County, in the general area where the first collection from Michigan was made by Norman Fassett in 1932.

ASPLENIUM TRICHOMANES L. ALPENA: Limestone sink south of Leer, 2498; CHIPPEWA (mainland): Near Caribou Lake, *W. & H.* 53; Near Detour, 3217; BARAGA: Silver Falls, northeast of L'Anse, 3147; DICKINSON: Sturgeon River Gorge, *H. & H.* 735; Shore of Menominee River east of Kingsford, *H. & H.* 744; ISLE ROYALE: Siskowit Lake, *J. B. McFarlin* 2471 (MICH).

The Alpena station is the only one known in the Lower Peninsula. All previous Chippewa County records were from Drummond Island.

ASPLENIUM PLATYNEURON (L.) Oakes. CHIPPEWA: Near Caribou Lake, 3220.

The Ebony Spleenwort is one of Michigan's rarer ferns. Until the above find was made in July, 1952, the only Michigan stations known were a few scattered localities in the southwestern part of the Lower Peninsula. The Chippewa station was found while Dr. W. H. Wagner, Jr., R. F. Hauke, and the writer were botanizing some dolomite outcrops northwest of Caribou Lake. The writer found one plant growing in a shallow crevice in rock pavement and in an intensive search of the vicinity Hauke found one more plant. Among the interesting plants found nearby were *Botrychium lunaria* var. *minganense* and *Habenaria unalascensis*. So far as can be determined this is the farthest north for this species, the previous northern limit being Port Sydney in the Muskoka District of Ontario.

WOODWARDIA VIRGINICA (L.) Sm. BARRY: Otis Lake, Rutland Township, *W. & H.* 119.

PELLAEA ATROPURPUREA (L.) Link. DICKINSON: East of Quinnesec, 2880.

This is the second authentic station for this species in Michigan, the other being West Bluff, Keweenaw County, where it was discovered by M. L. Fernald's party in 1934. All other reports of the Purple Cliff Brake in Michigan have proved to be *P. glabella* Mett. Among these was a collection by C. F. Wheeler from Dickinson County, distributed as *P. atropurpurea* before *P. glabella* was recognized as a species. Several sheets of this collection have been seen but all are *P. glabella*. Both species were found at the Quinnesec locality growing within a few yards of each other but never together.

CRYPTOGRAMMA STELLERI (Gmel.) Prantl. DICKINSON: North of Norway, 2917; GOGEBIC: Gorge Falls, Black River, north of Bessemer, 2596.

The Dickinson station is on the same bluff as the new station for *Woodsia obtusa* reported in this article.

ADIANTUM PEDATUM L. ALCONA: North of Harrisville, 2447; Southeast of Curtisville, *H. & H.* 393; CHIPPEWA: East of Trout Lake, 3271; CLINTON: Near Hubbardston, *Halbeisen*, Sept., 1949; EATON: North of Vermontville, *Halbeisen*, Sept., 1951; IRON: Foot of Michigamme Mountain, 2945; LUCE: Near Upper Tahquamenon Falls, *McVaugh* 11463; North of Hendricks Quarry, 3210; MUSKEGON: *C. D. McLouth* (Mich. State College No. 643); OTSEGO: East of Gaylord, 2699; WEXFORD: West of Cadillac, 2435.

PTERIDIUM AQUILINUM var. LATIUSCULUM (Desv.) Underw. ALPENA: Shores of Whitefish Bay, east of Alpena, 2288; CHEBOYGAN: Near Douglas Lake, *J. H. Ehlers* 1624 (MICH); South shore of Burt Lake, 2693; GOGEBIC: Near mouth of Presque Isle River, 1186; HOUGHTON: Rabbit Bay, *O. A. Farwell* 12191; Silver Mountain, south of Alston, 3155; INGHAM: East Lansing, *B. A. Walpole* 1423; Iosco: Near Au Sable Point, *Halbeisen*, July, 1951, Near Oscoda, 2373; KALAMAZOO: East of Goose Lake, *C. R. Hanes* (personal collection); KEWEENAW: Lac La Belle, *O. A. Farwell* 12094; Bete Grise Bay, 3031; LAKE: Baldwin, *C. W. Bazuin*, Aug. 3, 1941 (AQUINAS COLLEGE); MONTMORENCY: East of Vienna, 2731; OGEMAW: East of West Branch, 2771; OSCODA: South of Mio, 2751; OTSEGO: East of Gaylord, 2703; ST. CLAIR: Near Port Huron, *C. K. Dodge*, July 25, 1892 (MICH); West of Ruby, *H. & H.* 101.

POLYPODIUM VIRGINIANUM L. ALPENA: Ledge on wall of limestone sink south of Leer, *H. & H.* 586; JACKSON: At bases of trees and on gravelly bank along shore of Clear Lake, 3229; first found by N. W. Katz; SCHOOLCRAFT: North of Manistique, 2657.

SUMMARY

Several new discoveries and rare ferns are discussed, including *Phyllitis scolopendrium* var. *americana*, *Asplenium platyneuron*, a *Cystopteris* with verrucose spores (*C. dickieana* ?) and an apparent hybrid between *C. fragilis* and *C. bulbifera* (*C. tennesseensis* ?). More than 180 Michigan county records, for 36 entities in Osmundaceae and Polypodiaceae, are cited.

CRANBROOK INSTITUTE OF SCIENCE, BLOOMFIELD HILLS, MICH.

Shorter Notes

FERN AGES, "FREAKS," AND ENVIRONMENT.—In 1917, when I married Charles Alfred Weatherby, my first request, quickly granted, was for a fern garden. In the fall of that year I was visiting in Windsor, Vermont, and found a beautiful Braun's Holly-fern which I brought home in my arms; it became the first rare fern in my garden. Two years later while we were in Woodstock, Vermont, we found a very large specimen of the male-fern which was transferred to our garden. About the same time we found plants of the narrow-leaved spleenwort and Goldie's Fern which we added to our collection; these we found in Hartland Hollow, Connecticut, in an area now at the bottom of a large reservoir.

In 1928 we moved to Cambridge, Massachusetts, where we had already prepared a home for our ferns. We brought the four above-mentioned ferns with us, and today, some 25 or more years later three are still living. The Braunii shows its age. It is smaller with only 14 fronds and these about half the length of the original ones. I don't know its age at the time I found it but I have had it 37 years. The male-fern now has two extra clumps beside the parent, which is as vigorous as when planted. The narrow-leaved spleenwort has simply walked all over the bed, even ventured into the lawn, but the original plant is non-exisiting. The *Goldiana* was killed at the age of 28 when a naughty boy jumped the fence and landed on it after it had set its buds for the winter. It was quite vigorous and I doubt not would still be alive otherwise.

In our present fern bed we have a few interesting "freaks," as my husband called them. They were sent to him to name and we planted them in our garden to see if a change of environment would restore them to normalcy. One is *Polystichum acrostichoides* f. *multi-*

fidum Clute, found in Vermont by Mrs. Chisholm,[1] which is still growing and has even made two new plants; it and its off-spring are as "freaky" as ever. Another freak is a "Fish-tail" Christmas Fern sent us some 15 years ago. Each spring when it comes up we say "At last it has decided to be normal," but each time before the season is ended it has developed its forked fronds.

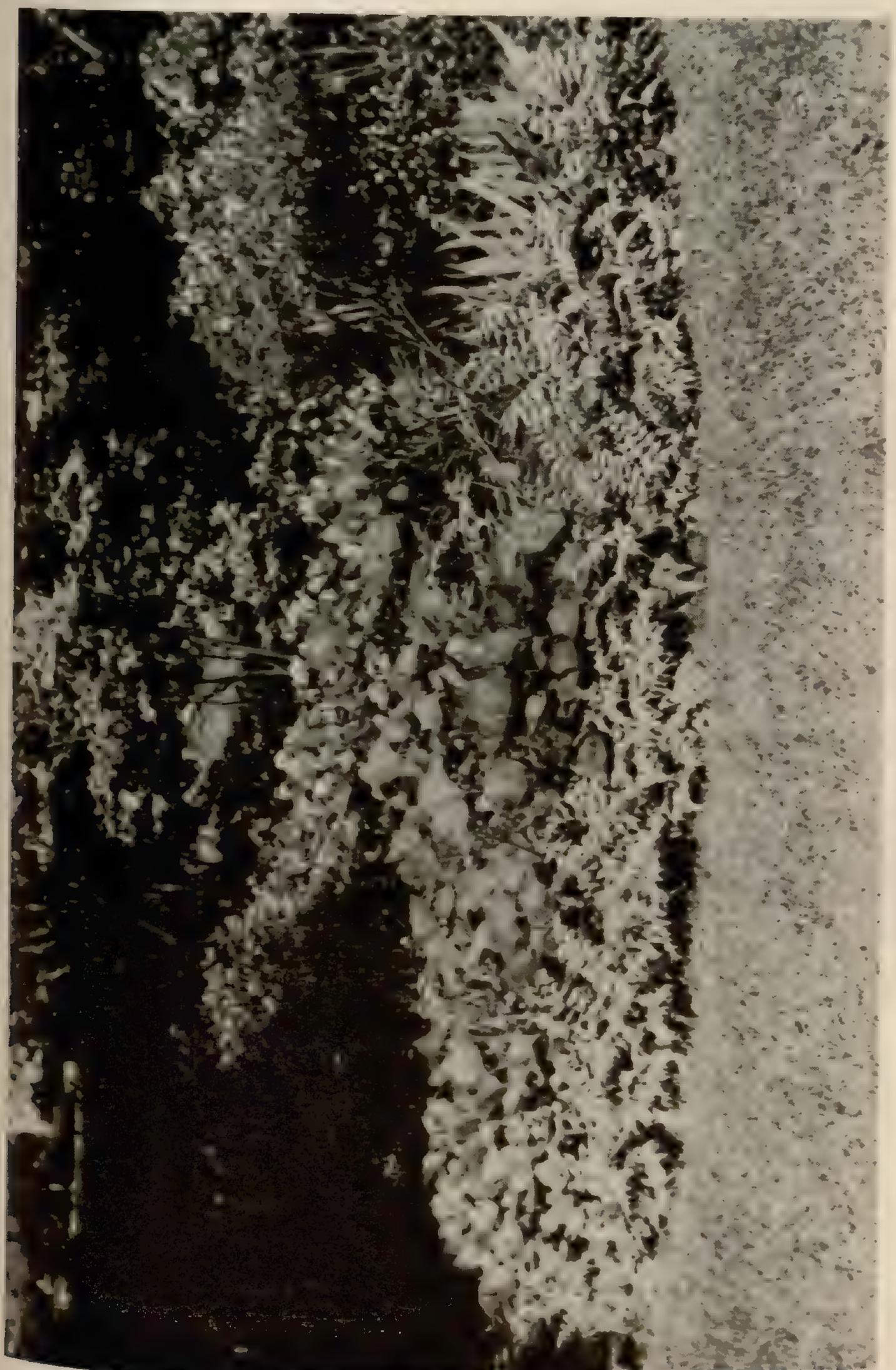
Some ten years ago, Mrs. Richardson of South Lyndeboro, New Hampshire, sent us a frilly or tufted wood-fern which she called *Dryopteris intermedia.* As it grows older it becomes more frivolous and adds extra frills and at present is a beautiful fern that a florist might well prize.

The one fern which showed any effect of environment was a plant of our ordinary Ebony Spleenwort which after 5 years in a sunny place next to a warm cellar wall completely changed itself to Prof. Fernald's Virginia var. *euroaustrinum,* showing that it should take more than environment on which to found a new variety. Somewhat similar is the western bracken. A California botanist sent us a plant of *Pteridium aquilinum* var. *pubescens* which we planted in the sunniest place we had beside our fence. When we left East Hartford, it was about 5 years old and after we had untwined it from the fence and held it up it was about 5 feet long but unable to stand alone. We did not bring it with us.

Whatever one's interest in ferns may be, Ferns are Fun.—UNA F. WEATHERBY, *Cambridge, Massachusetts.*

JAPANESE VARIEGATED FERN AS A BORDER PLANT.—The Japanese variegated fern, *Athyrium Goeringianum* f. *pictum,* makes an excellent border in the garden. Its habit of sending out shoots from the rootstock soon increases the number of plants, which never get out-of-bounds, however. Its low growth, 12–16 inches, and

[1] For an account of its discovery see C. A. Weatherby, A Curious Phenomenon in the Christmas Ferns. This JOURNAL 22: 55. 1932.



Border of Athyrium Goeringianum f. pictum

variegated color are most attractive and the plants are hardy here on Long Island.[1] It has a long growing season The fronds are unaffected by fungous or insect attacks. The accompanying photograph shows a border—about three years old—of this fern in good sunlight in front of flowering annuals and shrubs.—Walter S. Allen, *Flushing, N. Y.*

DO FERN SPORES CAUSE ALLERGIES?—This question has been raised in conversations a number of times lately but without gaining any definite information. Back letter files have brought to light a communication from R. P. Wodehouse, the expert on pollens as allergens, who was long associated with the Arlington Chemical Co., of Yonkers, N. Y., in providing pollens and other materials used by physicians for allergy treatments.

"I have only two references to allergy from fern spores:

Schoenwald, Philip. Atmospheric causes of allergy in western Washington. Northw. Med. 36 (1): 14–19. 1937.

Peshkin, M. M. (title not recorded.) Jour. Am. Med. Ass. 82: 1854. 1924.

"The first author records catching on his atmospheric pollen slides spores of *Pteridium aquilinum,* positive skin tests, and improvement of symptoms by adding an extract of the spores to hayfever patients' treatments. The evidence is circumstantial and not entirely convincing. The second author reports asthma in a medical student from handling lycopodium spores, to which the student also gave a positive skin reaction.

"For nearly twenty years, we have offered for sale spores of several ferns, including two osmundas and two lycopodiums. These have occasionally been bought by physicians and presumably tested on hayfever patients, but the results have not been reported.

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[1] And much farther north. R. C. B.

"I frequently catch fern spores on my pollen slides, but only four or five at a time as compared with hundreds and thousands of the pollen grains of grasses, ragweeds, and trees. I believe that fern spores are quite capable of causing hayfever but rarely, if ever, do so, because they are not abundant enough in the air."[1] —R. C. Benedict.

Recent Fern Literature

A NEW ENGLER'S SYLLABUS.[2] The eleventh edition (by L. Diels) of A. Engler's Syllabus der Pflanzenfamilien, which was published in 1936, has been unavailable for a long time and so a twelfth edition of this standard reference work was much needed. Dr. Melchior and Dr. Werdermann are to be congratulated on the fine job they have done in producing a new edition—really an entirely new work, for all the text is rewritten and the illustrations are all new. In contrast to previous editions, this work will be divided into two volumes, the one at hand containing the Bacteriophyta through Gymnospermae. The tremendous advances made during recent years have made the preparation of a comprehensive work of this kind more or less an impossibility for one or two authors. Wisely, the authors have called on specialists to contribute various parts. Dr. Melchior himself undertakes the Pyrrophyta, the Phaeophyta, and Rhodophyta, and Dr. Werdermann the Fungi. The Bacteriophyta, Cyanophyta, and Myxophyta are done by E. W. Schmidt, the Glaucophyta by H. Skuja, the Euglenophyta, Chlorophyta, and Charo-

[1] One plant-mounter in the U. S. National Museum refused to mount ferns, claiming that the spores caused her nasal distress.—C. V. M.

[2] Engler, A. Syllabus der Pflanzenfamilien. Ed. 12. Vol. 1. By H. Melchior and E. Werdermann. pp. 1–367. *fig. 1–140.* 1954. Gebrüder Borntraeger, Berlin–Nikolassee, Germany.

phyta by H. Beger, the Chrysophyta by W. Krieger, the Lichenes by F. Mattick, the Bryophyta and Pteridophyta by H. Reimers, and the Gymnospermae by R. Pilger (completed by H. Melchior).

Dr. Reimers' treatment of the Pteridophyta is commendably conservative but does not ignore the significant recent work. Among the novelties may be mentioned the recognition of a family Tmesipteridaceae (to include *Tmesipteris*) as distinct from Psilotaceae, and the treatment of a group Osmundidae[2] as coordinate with and intermediate between the Eusporangiatae and Leptosporangiatae, chiefly on the basis of the lack of an annulus. In the Polypodiaceae Christensen's divisions into subfamilies is followed closely. On the whole it must be said that Dr. Reimers' treatment does not contribute much that is new, but it does fulfill its purpose of presenting a concise synopsis of the current status of the group. The work should prove useful to those students able to read German.

There is hardly space here to go into detailed criticism. It is to be noted that *Isoëtes* is treated as neuter erroneously; it is true that in Pliny's classical usage the name was neuter, but Linnaeus adopted the feminine gender and he must be followed according to our rules. In the account of the Gleicheniaceae the genus *Sticherus* is misspelled *Stichocerus* (one of the few typographical errors noted in the entire work). *Woodwardia radicans* is said to range to the Pacific States and Guatemala, thus inferentially including our western *W. Chamissoi* and the tropical American *W. spinulosa,* which brings up a matter worth looking into; the relationships of the European *W. radicans,* the east-Asiatic *W. japonica,* and the American species are little understood and would make a suitable problem, perhaps not too difficult, for a student of fern taxonomy. It is too bad that a synopsis

[2] It would seem that the alternative name Protoleptosporangiatae is preferable, as showing coordinate rank more clearly.

of all the families of Filicales is not given, that on pages 293 and 294 being confined to the seven "more important" families, the six additional small families being omitted.—C. V. MORTON.

INDEX MARSILEATA ET SALVINIATA.[1] This index to all the published names *Marsilea, Pilularia, Regnellidium, Salvinia,* and *Azolla,* will be valuable to herbaria and professional taxonomists. Dr. Reed rejects Svenson's treatment of *Azolla,* and reduces *A. microphylla* and *A. mexicana* to the synonymy of *A. caroliniana.*[2] According to Reed there are six valid species of *Azolla,* viz. *A. caroliniana, A. filiculoides, A. imbricata, A. nilotica, A. pinnata* (with var. *africana*), and *A. rubra;* the first two are American, and the remainder Old World. The treatment of the United States species of *Marsilea* follows Braun's Index closely. The new Gray's Manual and Gleason's New Britton and Brown Illustrated Flora both recognize *M. mucronata* as a valid species and assign it a wide range from Florida to Arizona and north to Alberta, whereas Reed calls it *M. vestita* var. *mucronata* and restricts it to Texas and New Mexico. His basis for this treatment ought to have further comment.

It should be noted that the names "Marsileata" and "Salviniata" are adopted by Reed (following Nakai, 1949) as Classes, each with the single Orders Marsileales and Salviniales. These are stated to be in accordance

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[1] By Clyde F. Reed. Boletim da Sociedade Broteriana, ser. 2. 28: 5–61. 1954.

[2] The matter deserves further study, a study complicated by the difficulty of finding fruiting material. According to Svenson, the megaspores of *A. caroliniana* have never been found. The species has spread widely through the southeastern United States and the West Indies by vegetative methods. Field studies might contribute much. The most suitable colony for study would be one which was faced with a period of desiccation; under the threat of a prolonged drought, plants normally sterile might be induced to produce megaspores, unless for some reason this has become impossible. It is possible that this species has lost the power of sexual reproduction because of some genetic unbalance.

with the rules of nomenclature, but they are not. According to the International Code of Botanical Nomenclature (Utrecht, 1952), Recommendation 26A, the names of Classes are formed with the ending *-opsida*, although exceptions could be allowed for customary usage. These "Class" groups are of much higher rank than is intended for *Marsilea* and *Salvinia*. There are differences between the different systems in vogue. According to the Englerian system, the Division Pteridophyta is divided into four Classes—Lycopsida, Psilotopsida, Sphenopsida, and Filices (or Filicineae) (Pteropsida p.p.). The subclasses of Filices are Eusporangiatae and Leptosporangiatae; *Marsilea* and *Salvinia* are definitely to be included in the Subclass Leptosporangiatae, under which they can be considered to form groups (Orders) Marsileales and Salviniales coordinate with Filicales, which is Dr. Reed's real intention. The "Class" names Marsileata and Salviniata must be rejected.—C. V. MORTON.

OPHIOGLOSSACEAE OF THE HAWAIIAN ISLANDS.[1] Five species of Ophioglossaceae are now known from the Hawaiian Islands, one of *Botrychium* (*B. subbifoliatum* Brack., considered as perhaps a primitive ally of our *B. dissectum*) and four of *Ophioglossum* (*O. petiolatum* Hook., *O. concinnum* Brack., *O. nudicaule* L. f., and *O. pendulum* L. subsp. *falcatum*), all of which are rare except the last. Reported for the first time from the islands is *O. nudicaule*, the first certain collection being from 1950; there is an early collection (not seen by Clausen) of this species in the National Herbarium but without definite locality or date ("*Ophioglossum concinnum*," Hawaiian Islands, Herb. John Donnell Smith ex Herb. D. D. Baldwin, no. 113). The specimens on which the report of *O. ellipticum* from Kauai, Maui, and

[1] By Robert T. Clausen. Amer. Journ. Bot. 41: 493–500. 1954.

Hawaii was based by Brackenridge are also in the National Herbarium; these are guessed by Clausen to be either *O. petiolatum* or *O. concinnum;* they are the former. The most important parts of Clausen's paper are concerned with the relationship between *O. pendulum* and *O. falcatum* (and he demonstrates conclusively that there is no fundamental discontinuity between them and that the latter should be considered as a subspecies of the former) and with the general phylogeny of the Ophioglossaceae, the reasonable conclusion being reached that *Botrychium*, subg. *Sceptridium* (*B. multifidum* and its allies) is the most primitive and *Ophioglossum, subg. Ophioderma* (*O. pendulum*) the most advanced.—C. V. MORTON.

That common fern species may offer opportunities for significance research is well illustrated by a paper by Steeves and Wetmore.[1] For several years, the authors studied the stem structure and the succession of leaves in the cinnamon fern as they develop through different seasons. The massive base structure of a mature plant, sometimes a foot in thickness, hides under a thick tangle of black, wiry roots, a stem less than half an inch thick, surrounded with an inch layer of old leaf bases. At the end of a growing season, the apex carries a succession of leaf primordia, enough for four seasons of development. In the oldest of this series, destined for development the following spring, as many as 30 embryonic leaves may be identified, of which as many as ten, those toward the growing tip, may actually unroll as green and fruiting leaves, the others aborting and serving only as protective scales or "catophyls." That the latter are potentially leaves was demonstrated by the experimental cutting off of the newly developed leaves during June. This forces some of the "cato-

[1] Steeves, T. A. and Wetmore, R. H. Morphogenetic studies on Osmunda cinnamomea. Phytomorphology 3: 339–354. 1953.

phyls'' to take over their true leaf function and unroll as replacements for the lost foliage leaves.—R. C. B.

American Fern Society

SPORE EXCHANGE. In a bulletin sent to all members about May 1, 1954, announcement was made that Mrs. Kathryn Boydston, Fernwood, R. D. 3, Niles, Michigan. had agreed to handle an exchange of fern spores. A request was made at that time for gifts of spores to serve as a start. The following is a summary statement of Mrs. Boydston's report for 1954.

Spores of more than 90 species and varieties have been received, representing gifts from the eight donors listed below. They comprise collections from California, Florida, and other parts of the United States, and also a number from England and continental Europe. Some exotic species often cultivated as house-plants are included in the Florida collections.

Members are urged to aid in the further development of this program as well as to apply for species in which they are interested. Since the supply of some of the species listed is very small, and since fresh collections are always more viable than those of earlier seasons, continued donations will be welcome, both of the species listed below and of other species. In order to make the exchange self-supporting, it is requested that postage sufficient for shipping charges accompany requests for spores.

The donors of spores during 1954 were: Miss Harriet Baker and Mrs. M. L. Ashley Giauque (western spp.), Mr. John Lovis and Mr. Harold Rugg (English species), Mrs. Mary Diddell (Florida and cultivated spp.), Miss Emma Goff (fertile *Asplenosorus*), Mrs. Boydston (central and eastern U. S.), and R. C. Benedict (2 spp.).

The genera and species represented are:[1] *Adiantum Capillus-veneris, Jordanii. Asplenium Adiantum-nigrum, adulterinum, exiguum, fontanum, marinum, monanthes, montanum, pinnatifidum, platyneuron, resiliens, Ruta-muraria, serratum septentrionale, Trichomanes* and its forma *crispatum, viride, Anemia adiantifolia, phyllitidis, Asplenosorus ebenoides, Athyrium alpestre, filix-femina* (6 hort. varieties), *Blechnum occidentale, Spicant, Camptosorus rhizophyllus, Campyloneuron phyllitidis, Ceterach officinarum, Cheilanthes alabamensis, Clevelandii, Feei, gracillima, lanosa, lendigera, notholaenoides, siliquosa, Cryptogramma crispa acrostichoides, Cyclosorus dentatus, Cyrtomium falcatum, Cystopteris fragilis, fragilis tenuifolia, Doodia aspera, media, Dennstaedtia adiantoides, Dryopteris Filix-mas* (and hort. varieties), *Goldiana, ludoviciana, marginalis, spinulosa. Doryopteris concolor, Notholaena californica, Fendleri, Jonesii, Newberryi, Pellaea andromedifolia, atropurpurea, Bridgesii, glabella, mucronata, sagittata, Phlebodium aureum, Pityrogramma chrysophylla, triangularis, Polypodium angustifolium, virginianum, vulgare* (true), *vulgare grandiceps, Polystichum Andersonii, acrostichoides, Braunii, Lonchitis, Pteris cretica, multifida, vittata, Rumohra adiantiformis, Selaginella ludoviciana, Tectaria minima, Thelypteris hexagonoptera, uliginosa, Woodsia ilvensis, obtusa, scopulina, Woodwardia Chamissoi.*

R. C. BENEDICT, *Brooklyn, N. Y.*

FIELD-TRIPS SCHEDULED:

NEW ENGLAND. An excursion in New Hampshire and Vermont, July 15–17. For information consult Dr. Benjamin Allison, Alstead, New Hampshire.

BRUCE PENINSULA, ONTARIO, CANADA. An excursion the first week in September (preceding the Annual Meeting in East Lansing, Michigan), to view the Harts-tongue especially. Information from Dr. James Soper, Depart-

[1] The supplies of some species are exhausted.

ment of Botany, University of Toronto, Toronto, Canada.

NEW JERSEY PINE-BARRENS. A joint excursion with the Torrey Botanical Club, September 10. Curly-grass (*Schizaea*) is one of the possible finds. Instructions: Meet at 10:00 a.m. where Route 206 crosses the C. R. R. of New Jersey, at Atsion, N. J. Bring lunch and be prepared for wet walking. Further information from the leader, Dr. Louis E. Hand, Natchez Trail, Medford Lakes, N. J.

NEW MEMBERS

Mr. Thomas R. Barclay, Alstead, New Hampshire
Mrs. Thomas R. Barclay, Alstead, New Hampshire
Mr. Ray Garrett, 112 Magnolia St., Tampa 6, Florida
Dr. LeRoy K. Henry, Curator of Botany, Carnegie Museum, Pittsburgh 13, Pa.
Mr. Robert H. Mohlenbrock, Dept. of Botany, Washington University, St. Louis 5, Missouri
Mr. William F. Oliver, Jr., Box 67, Baldwin, Florida
Mr. George H. Paine, Jr., 446 Ludlow Highway, Ludlow, Kentucky
Mr. Albert B. Schultz, Jr., 143 Patton Ave., Princeton, New Jersey
Mrs. Clara Schultz, R. D., Stillwater, New York
Mr. Ewart G. Smith, 147–151 High St., Christchurch, C. 1, New Zealand
Mr. John H. Thomas, 2130 Bowdoin St., Palo Alto, California

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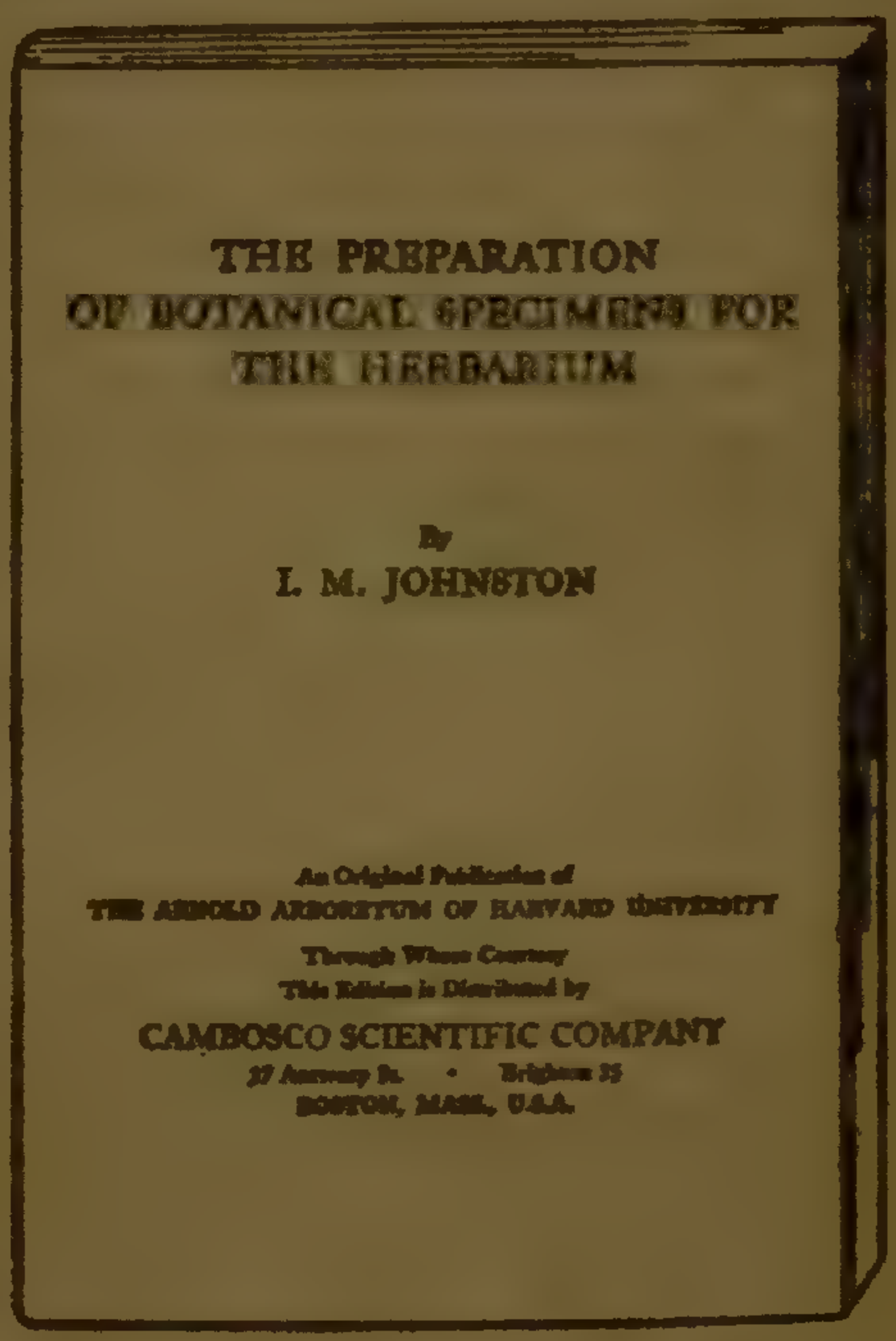

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A. C. SMITH

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American Fern Journal

VOL. 45 JULY–SEPTEMBER, 1955 NO. 3

The Substratum of Trichomanes petersii

EDGAR T. WHERRY

Many years ago naturalists in the Alps observed that certain species of plants grow chiefly or wholly on calcareous rocks, whereas others are restricted to siliceous ones. Similar relationships have now been reported in many other regions. The accepted technical terms for such plants are respectively calcicoles and silicicoles. Modern research has indicated that the basis for the difference is, in many cases, a matter of hydrogen ion concentration, the reaction from the calcareous substratum tending to be circumneutral (or somewhat alkaline) and that of the siliceous more or less acidic. Mathematically-minded ecologists have, to be sure, proved to their satisfaction that the plants concerned do not have any real reaction-preference. Their formulas are faultless, but their premises are wrong.

The earth's surface is a vast mosaic of environments, and even in regions where one or the other type of substratum above mentioned is predominant, isolated patches of the contrasted type occur in greater or lesser quantity. The disseminules—spores or seeds—of plants fall alike on both, and, should a given taxon be indifferent to soil reaction it will grow equally well on both. On the other hand, those plants having specialized physiological characteristics, although they may grow sporadically anywhere, will form successful, self-perpetuating colonies only on the substratum to which they are adapted. Ferns are especially suitable for studies of

[Volume 45, No. 2, of the JOURNAL, pp. 57–92, was issued June 17, 1955.]

such relationships.

I have found *Trichomanes petersii* in Alabama, Mississippi, South Carolina, and Tennessee, thriving in all cases on granite, sandstone, and the like, in other words on siliceous and correspondingly acidic substrata. However, a report of its discovery in Haiti suggested that it might be indifferent after all, for that island is well known to be largely of calcareous rocks. Fortunately, a geologic map was available, and when the place where the fern had been found was located thereon, it proved to be not on limestone at all, but in an area of igneous rocks which may well be acidic in character. The species could still be classed as a silicicole.

Then the St. John brothers reported it in the limestone country in Florida where they made so many interesting fern finds. This I had to see, so a trip was arranged. There was no doubt about it, we entered a limestone sink; but the curious fact was that, although there were numerous seemingly suitable ledges available, the fern grew only on two isolated blocks of rock. It did not take long to ascertain that these were not limestone at all, but were chert, than which nothing could be more siliceous.

In this Journal[1] for January–March, 1955, there are two reports which might seem to conflict with the above remarks. On page 2, line 7, Dr. Duncan tells of finding *Trichomanes petersii* "on huge limestone rocks." I have been in many of the gorges of the Cumberland Plateau and have found the rocks there not to be limestone but massive white sandstone, so I feel justified in concluding that such is the case in Gayton Gulf too. On page 54, line 16, Mr. Brass refers to an occurrence in an area of "low limestone outcrops," but it was lim-

[1]This JOURNAL 45, No. 1.

ited to "only one rock," which I venture to predict would be found on further examination to consist of chert.

PHILADELPHIA, PENNSYLVANIA.

Toxicity of Ferns and Equisetum

RICHARD W. POHL

In a recent issue of this journal, Rapp (1954) presented a rather complete review of the older literature bearing on the toxicity of *Equisetum* to horses. Unfortunately, Rapp apparently did not have access to some recent work in veterinary medicine, in which the actual "poison" of bracken and *Equisetum* is shown to be an enzyme, thiaminase, which destroys vitamin B_1 (thiamin) in the gastrointestinal tract of the horse, whereupon the animal dies of an avitaminosis. In a paper by Evans *et al.* (1951) it is shown that the symptoms of bracken "poisoning"—incoordination, rough coat, and nervous disorders—are accompanied by a very low level of thiamin and a high level of pyruvate in the blood. These are definite indications of deficiency of thiamin. Injections of 50–100 mg. of thiamin per day brought rapid recovery of horses which had already gone down. After partial recovery, such horses would again sicken and die if they were kept on a bracken and hay diet with thiamin withheld. In the same paper, it is also shown that the enzyme thiaminase is present not only in bracken but in *Dryopteris Filix-mas, Equisetum arvense*, and *E. palustre*. In all probability, it will be found in other ferns and horsetails as well.

Osebold (1951), in a paper on bracken "poisoning" in cattle, stated that no alkaloids, phytotoxins, saponins, or glucosides could be found in bracken.

Henderson *et al.* (1952) were able to demonstrate that thiamin injections could cure horses "poisoned" by *Equisetum arvense* taken in hay. They also demonstrated *in vitro* the presence of an enzyme capable of causing a nearly total inactivation of thiamin.

This enzyme thiaminase is not a poison in the usual sense of the word, for it has no physiological action upon the body of the animal, but merely destroys an essential constituent of its food. The diseased condition of horses consuming these plants should therefore be regarded as nutritional deficiency rather than poisoning.

The cause of bracken poisoning in ruminants is less clear than in the case of the horse. Osebold has shown that cattle "poisoned" by bracken show aplastic anemia. Their thiamin levels, while lower than normal, do not decline as those of the horses do. A brief article in the Journal of the American Veterinary Medicine Association (1953, p. 527) indicates that bracken contains a thermo-labile substance which renders the plant deleterious to cattle. Heating the bracken to 210° F. for thirty minutes rendered it non-harmful to cattle. Another abstract appearing in this journal (1954, p. 407) states that vitamin B_1 injections did not cure bracken disease in cattle; another abstract relates that injections of thiamin and onion juice caused rapid recovery of affected cattle.

LITERATURE CITED

Anonymous. 1953. Bracken poisoning in cattle. Journ. Amer. Vet. Med. Assoc. **123**: 527.

Anonymous. 1954. Bracken poisoning in cattle. *op cit.* **125**: 398, 407.

Evans, E. T. Rees, W. Charles Evans, and H. E. Roberts. 1951. Studies on bracken poisoning in the horse. Brit. Vet. Journ. **107**: 364–378.

Henderson, J. A., E. V. Evans, and R. A. McIntosh. 1952. The antithiamine action of *Equisetum*. Journ. Amer. Vet. Med. Assoc. **120**: 375–378.

Osebold, J. W. 1951. An approach to the pathogenesis of fern poisoning of the bovine species. Journ. Amer. Vet. Med. Assoc. **119**: 440–441.

Rapp, Wm. F., Jr. 1954. The toxicity of *Equisetum*. Amer. Fern Journ. **44**: 148–154.

DEPT. OF BOTANY AND PLANT PATHOLOGY
IOWA STATE COLLEGE, AMES, IOWA

Asplenium cryptolepis on Manitoulin Island

JAMES H. SOPER

Towards the end of July, 1952, the author spent several days botanizing, in company with Mr. John Clayson, of Weston, on Manitoulin Island, Ontario, a large island in Lake Huron between the Bruce Peninsula and the Upper Peninsula of Michigan. On one occasion when we were returning from an excursion to Providence Bay on the south shore of the island to our base camp at Little Current on the north shore we made a very brief but rewarding stop near the little Indian settlement of Excelsior, at the south end of West Bay. Between West Bay and Manitou Lake there is a prominent headland known as High Hill. According to Chapman and Putnam (1951), High Hill stands "over 500 feet above the level of Lake Huron or more than 1100 feet above sea-level and is one of the two highest points on the island." It is part of the Lockport dolomite formation which "covers the southern two-thirds of the island," and is an outstanding example of its northern edge where "this formation is seen in perpendicular cliffs." For a distance of three to four miles the present road from Excelsior to Little Current comes quite close to these cliffs and makes them readily accessible.

Choosing a place where it was possible to park the car just off the road, John and I decided to climb the cliffs. As it was late in the day and our vascula were already filled, we did not intend to make it a collecting side-trip.

In the back of my mind, however, was the possibility that Hart's-Tongue Fern might be found here for these cliffs represent part of the extension of the Niagara Escarpment with which that fern is often found associated in the lower part of the Bruce Peninsula and southward. After leaving the car we climbed abruptly through a wooded area which covered the rocky talus slope below the exposed part of the cliff. Arriving at the perpendicular part of the cliff we explored to the left and right along its face as well as over and around the large blocks of dolomite which had fallen away from the cliff itself. Here we noted such ferns as *Polypodium virginianum*, *Asplenium Trichomanes*, *Cryptogramma Stelleri*, and *Pellaea glabella*, all characteristic of the escarpment on the mainland of southern Ontario. As for the Hart's-Tongue (*Phyllitis Scolopendrium*), if it was there, we missed it on that short visit.

However, we did find something we had not seen before—the American Wall Rue, *Asplenium cryptolepis* Fernald (1928). This tiny fern was growing in horizontal crevices and on shallow ledges near the bottom of the rock-face and also on similar locations on the very large and often greatly tilted dolomite blocks at the upper edge of the talus slope. In both situations the fern would probably be in shade for a greater part of the day but receive some sunlight for a short period. Being without a vasculum I placed the largest specimen under my hat and wrapped up several smaller ones in my pocket handkerchief. Both hands were needed for moving about on the rocky terrain. The final ascent was completed without any more interesting discoveries and a splendid panoramic view of the adjacent land and water was obtained from the crest of the escarpment. A careful and uneventful descent brought us back to the car with our treasure.

At first, in checking the literature and available her-

barium specimens, I discovered references to only one previous collection of *Asplenium cryptolepis* on Manitoulin Island—a note by Taylor (1934), who, in addition to reporting areas on the Bruce Peninsula (Flowerpot Island, Dyer's Bay, and Lion's Head), cited a specimen from Manitoulin Island collected in August, 1901, by a Dr. Scott "on rocks, north end of Manitoulin Island" (Geol. Surv. Can. no. 66,415). Professor Taylor stated that "Up to 1933 no new stations in Ontario have been added as far as the writer is aware, nor does there appear to be any published record of its re-collection on Manitoulin Island." I was, therefore, considerably elated over our own collection from near West Bay, since it re-established the existence of this rare fern on Manitoulin Island where it appeared not to have been collected for fifty-one years.

Recently, however, I have learned that this same fern was collected in 1932 on another headland, called Battery Bluff, approximately 30 miles west of High Hill on another deep bay along the north shore of the island. Two localities are therefore known on Manitoulin Island. It has not yet been possible to determine where Dr. Scott's specimen was collected, for his statement of the locality is too vague without additional information. His locality may have been the same as one of the two more recently discovered stations but it could have been a third distinct locality.

Fernald (1935, p. 209) published a map on which may be distinguished four records plotted in the Bruce-Manitoulin region. I believe that these were intended to represent (from south to north) Lion's Head, Dyer's Bay, Flowerpot Island, and Scott's "north end of Manitoulin Island," Fernald evidently taking the extreme western end of Manitoulin Island as Scott's locality. Although the western end of the island *is* geographically northern, so also are the two recently discovered

Known Stations of Asplenium cryptolepis in the Lake Huron Region

stations on the northern side of the island, and this is the side on which the type of cliff that supports this fern occurs. In any case, it seems worthwhile to publish these new records and to present a revised map of the Lake Huron section of the range of this fern.

It is interesting to note that the Wall Rue has also been reported by Billington (1952) from the counties of Keweenaw and Chippewa in the Upper Peninsula of Michigan. The Chippewa record is based on a collection made on Drummond Island by the First Michigan Geological Survey, August 3, 1839. The records taken together now form a good series stretching from Lion's Head on the Bruce Peninsula to Drummond Island at the western end of Lake Huron. It seems likely that more careful botanizing in the future will yield additional localities within these limits, if not also beyond them, on similar habitats. The cliffs along the east side of the Bruce Peninsula have not been carefully searched, nor have others on the north side of Manitoulin Island. The same probably applies to the westward continuation of the Niagara escarpment beyond Manitoulin Island. This escarpment extends from Manitoulin through the neighbouring islands (including Drummond Island) and then "crosses the upper peninsula of Michigan and swings southward along the margin of that lake . . . [where] . . . it forms the Door peninsula in Wisconsin but disappears west of Chicago" (Chapman & Putnam, 1951).

On the map the known localities for *Asplenium cryptolepis* in the Lake Huron region have been plotted. The numbers given to the localities correspond to the following list of records:

1. Drummond Island. A single collection: Drummond Island (Chippewa County, Michigan), Aug. 3,

1839, First Geological Survey (MICH).[1] This appears to be the first collection of this fern in the Lake Huron region and is one of the two records plotted for Michigan by Billington (1952). The exact locality was not stated on the specimen but it was probably the northern or eastern side of the island where cliffs of similar origin and structure to those of the Bruce and Manitoulin would most likely occur.

2. Flowerpot Island. This is a small island about four miles northeast of Tobermory, Bruce County, Ontario, in the straits which separate Lake Huron and Georgian Bay. Specimens seen: limestone cliffs, Aug. 8, 1892, *P. J. Scott* (WO), the first Canadian record, reported the same year by Burgess (1892); Aug. 26, 1905, *A. B. Klugh* (TRT); Sept. 3, 1928, *W. R. McColl* (TRT); August 25, 1930, *J. L. Baillie* (TRT); shaded limestone rocks, east side of the island, June 21, 1931, *J. F. Calvert* (JFC).

3. North End of Manitoulin Island. A single collection: on rocks, north end of Manitoulin Island [without exact locality], Aug., 1901, Dr. [*P. J.*] *Scott*, Geol. Surv. Can. 66415 (CAN, accession no. 2154). This is the first record for Manitoulin Island but has not been plotted on the map because the exact locality has not been determined. It was erroneously reported as new to Canada by J. M. Macoun (1906) who was apparently unaware of Dr. Scott's collection in 1892 from Flowerpot Island reported earlier in the same journal.

4. Battery Bluff. This station is in the township of

[1] Abbreviations for herbaria are as follows: BLH, Cranbrook Institute of Science, Bloomfield Hills, Michigan; CAN, National Museum of Canada, Ottawa, Ontario; DAO, Department of Agriculture, Ottawa, Ontario; JFC, Herbarium of Mr. J. F. Calvert, London, Ontario; MICH, University of Michigan, Ann Arbor, Michigan; MT, Herbier Marie-Victorin, Institut Botanique, Université de Montréal, Montréal, Québec; OAC, Ontario Agricultural College, Guelph, Ontario; TRT, University of Toronto, Toronto, Ontario; WO, University of Western Ontario, London, Ontario.

Robinson, on Manitoulin Island, Ontario. Specimen seen: limestone edge, Battery Bluff, 45° 52′ N., 82° 48′ W., Aug. 9, 1932, *C. O. Grassl* 1635 (DAO; also MICH, BLH, fide D. J. Hagenah).

5. Dyer's Bay. This bay is located in Lindsay Township on the east side of the Bruce Peninsula about five or six miles south of Cabot Head, which is at the northern tip of the east coast. Judging from the records available there may be two stations involved, one at or just south of Dyer's Bay itself and the other a mile or so farther north near Gillies Lake. Specimens seen: limestone boulders, foot of cliffs, north of Dyer's Bay, June 20, 1933, *Stebbins Jr. & Loveless* 6 (MT) (near Gillies Lake, according to Stebbins);[2] crevices of exposed dolomite blocks, Dyer's Bay, Aug. 24, 1933, *T. M. C. Taylor* 6132 (TRT); Dyer's Bay talus, June 20, 1936, *P. V. Krotkov* 10100 (TRT).

6. Lion's Head. Another prominent set of cliffs also on the east coast of the Bruce 12 to 15 miles south of Dyer's Bay in Eastnor Township. This is the most southerly record yet seen for this fern in Ontario. Specimen seen: dry crevices, crest of limestone cliffs, Lion's Head, June 25, 1933, *Jenkins & Stebbins Jr.* 5 (TRT) (south of Lion's Head according to Stebbins[3]).

7. High Hill. This is the name of the prominent headland or set of cliffs just east of West Bay along the north side of Manitoulin Island. As stated above, the station is on the west side of this headland near the little Indian settlement of Excelsior, in Billings Township. Data for the collection are as follows: in crevices of limestone [dolomite] cliffs and boulders about one mile east of West Bay, 45° 50′ N., 82° 9′ W., Manitoulin Island, Manitoulin District, Ontario, July 27, 1952, *J. H. Soper & J. Clayson* 5710 (TRT).

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[2] Rhodora 37: 65. 1935.
[3] *op. cit.* 71.

I am greatly indebted to Mr. D. J. Hagenah for supplying information about specimens in the herbaria of the Cranbrook Institute and of the University of Michigan. The field work and phytogeographic research which made this study possible have been supported by grants from the Research Council of Ontario and from the University of Toronto.

REFERENCES

Billington, C. 1952. Ferns of Michigan. Cranbrook Inst. Sci. Bull. 32, viii + 240 pp.

Burgess, T. J. W. 1892. A Fern New to Canada. Ottawa Nat. 6: 115.

Chapman, J. L. & D. F. Putnam. 1951. The Physiography of Southern Ontario. Univ. of Toronto Press. xxi + 284 pp.

Fernald, M. L. 1928. The American Representatives of *Asplenium Ruta-muraria*. Rhodora 30: 37–43.

Fernald, M. L. 1935. Critical Plants of the Upper Great Lake Region of Ontario and Michigan. Rhodora 37: 197–222; 238–262; 272–301; 324–341.

Macoun, J. M. 1906. Contributions to Canadian Botany, XVII. Ottawa Nat. 20: 135–143.

Taylor, T. M. C. 1934. Notes on Some Ontario Pteridophytes. Amer. Fern Journ. 24: 79–83.

DEPARTMENT OF BOTANY, UNIVERSITY OF TORONTO

Rediscovery of Lygodium palmatum in Georgia

FRANKLIN D. SNYDER

On Sunday, January 16, 1955, I had made an appointment with my friend, Mrs. Sammy Ledbetter, to help relocate a colony of *Gaultheria procumbens* L., a plant nearing its southern limit in northeastern Georgia, and extremely rare in this area. Two weeks previously I had searched for it and became lost in this rugged mountainous area. On our return from a successful collecting trip, Mrs. Ledbetter asked me to look at a plant growing on the road-bank in front of their summer cottage. You can imagine my delight and surprise to see

that it was *Lygodium palmatum*. This new station is in Rabun County, on the north side of Lake Nacoochee, approximately $\frac{1}{4}$ mile above the dam.

A few weeks later while visiting Dr. A. Heyn, of Clemson, South Carolina, I told him of my find. He mentioned that he had collected a plant near his cottage on Lake Tallulah, in Rabun County, Georgia, which might be the same. It did indeed prove to be the climbing fern. It has been brought to my attention that a student of the University of Georgia had collected this fern last summer in Haralson County, Georgia.

William Bartram in his travels through eastern Georgia in 1773 made reference to a plant which is interpreted as climbing fern. From that date to this no recorded collection has been made, and it is thus remarkable that after being lost for so many years it should be collected by three different people within a short period of time.

The author is indebted to his friend, Dr. Wilbur Duncan, for verification of the determination. Material is on deposit in the Herbarium of the University of Georgia.

Weed-killers and Roadside Ferns

R. C. BENEDICT

Under a conservation headline, some of the dangers to natural vegetation from the indiscriminate spraying of roadsides with weed-killing chemicals is discussed in a New York Times article of Nov. 7, 1954. While the value of 2,4-D and other herbicides against ragweed is recognized, it is pointed out that the spraying of roadsides that have well-developed natural herbage and low shrubbery can have practically no value in the fight against ragweed and its hay-fever effects. Ragweed is scarcely to be found mixed in any quantity in such situations. Moreover, the killing effect of such spraying on non-allergenic vegetation may even increase the possibili-

ties for the later spread of ragweed.

Two instances of such harmful spraying came to my attention during the summer of 1954. In May, along a little-travelled back-road near Fortsville, N. Y., a few miles south of Glens Falls, the peculiar appearance of royal ferns was first noted. Closer examination showed the curling and twisting associated with the use of 2,4-D. Other osmundas and the other fern species, together with various seed plants were similarly affected for a stretch of a quarter of a mile. The roadside was low and somewhat swampy, and the woods pressed close on the right of way. Later, near Kattskille Bay, my attention was caught by what was reminiscent of hospital iodoform odors, but recalled also as associated with 2,4-D. A stretch of a hundred yards had been so heavily drenched that the odor persisted for some weeks. A complete browning and apparent killing of all plant growth seemed to be the result, although the woody plants may show revival in another year.

The first instances, near Fortsville, in Saratoga County, had evidently been the work of town or county road department workers. Whether it was hoped in this way to obviate the usual control of vegetation by mowing operations is unknown. The second instance was presumably a private venture. In neither case would anything effective in the general control of ragweed be attained, while the damage to ordinary vegetation, much of it attractive, including neighboring trees whose roots might be reached, would be certain.

That spraying of roadsides in the fight against ragweed may be justified under some circumstances is pointed out in the Times article. Where the roadsides are largely raw soil, from recent working or filling, ragweed can well be a predominant part of the early plant growth. Even in such cases a more permanent solution might better be achieved by seeding with grass or the promotion of some other desirable types of plants.

On the Occurrence of Pteris multifida in the United States

GEORGE NEVILLE JONES

In the temperate regions of the earth very few species of cultivated ferns escape from cultivation and become naturalized, but *Pteris multifida* Poir. is apparently an exception, as it is now fairly well established in the southeastern United States from North Carolina to Florida and Texas. It is known to occur elsewhere in the western hemisphere, as for example, in South America it has been found in Rio de Janeiro (Christ, 1910, p. 333), and according to Burkart (1933) is well established in and about Buenos Aires (*Burkart* 3337, GH). There are several records of its occurrence in Cuba, Guadeloupe, Montserrat, and St. Kitts, in the West Indies. The purpose of this article is to record its present known distribution in the United States.

This fern was first described in 1781 by Carolus Linnaeus, filius (1741–1783), as *P. serrulata*, but as this name is a later homonym of *P. serrulata* Forskal (1775), it is illegitimate. The correct name is *Pteris multifida* Poir. ex Lam.[1] In 1938, J. K. Small transferred it to Presl's genus *Pycnodoria*, retaining the generic name *Pteris* for *Pteridium*, the bracken. Common or English names that have been applied to this species include Chinese brake, Huguenot fern, saw-leaved bracken, spider brake, and spider fern (Weatherby, 1952, p. 149).

The native region of this fern is not certainly known, but it is thought to be China (Hooker, 1858, p. 167; Christ, 1897, p. 166; Christensen, 1906, p. 603). In 1781, Linnaeus filius gave the type locality of *P. serrulata* as "Habitat in Jamaica." When *P. multifida* was described by Poiret in 1804 it had been in cultivation for

[1] Encycl. Bot. 5: 714. 1804.

a long time and its origin had been forgotten: "Cette plante est cultivée au Jardin du Museum d'histoire naturelle de Paris. Son lieu natal ne m'est pas connu."

As to its occurrence in China today, DeVol (1945; and in a personal communication) says that it is perhaps the commonest fern in Central China, growing in wells, narrow alleys, on brick walls, in temple grounds, gardens, and on rocky ledges. It is found not so commonly on hillsides and near dwellings. When it grows in wells or in other sheltered places the fronds remain green the year round. There are specimens in the herbarium of the New York Botanical Garden from Kwangtung, Kiangsu, Kweichow, Shantung, and Fukien, and from Hondo, Kyoto, and Satsuma in Japan.

The length of time this fern has been growing spontaneously in the United States is not certainly known, but it is probably more than a century. In Charleston, South Carolina, it is said (Small, 1938, p. 107) to be called Huguenot fern because it is supposed to have been introduced by settlers from France. It was discovered growing spontaneously in Charleston by L. R. Gibbes in 1868 (Bragg, 1914, pp. 19–21). In Alabama it is reported (Mohr, 1901, p. 312) to have been first observed in 1870, and since that time has spread along the banks of water courses and ditches, and on old walls. It has long been known in Louisiana, and later it appeared in Florida, where it may be found on walls in St. Augustine (Small, l.c.). Toward the end of the nineteenth century it appeared in southeastern Illinois near the town of Mt. Carmel, where J. Schneck (1900, p. 201) reported it (as *P. cretica*) growing in the masonry of wells. According to information on one of Schneck's specimens (ILL), it originated from a cultivated plant purchased at Evansville, Indiana, in 1885. As it has not been collected in Illinois since 1902 it presumably no longer occurs there spontaneously. The spread of this species to

other states appears to have been relatively recent. By 1941 it had been collected in Arkansas (Chandler, 1941), and in Maryland and Mississippi. It was found in the San Gabriel Mountains of California in 1942. By 1944 it had spread to southeastern Texas (Soxman, 1945), and was reported to be growing in "wild and isolated places" in northern Colorado in 1953 (Diddell, 1953, p. 117).

For the following list of United States specimens, grateful acknowledgment is accorded to those botanists who have kindly responded with information from the herbaria under their charge, which are listed with the names of the curators (or assistants), followed by the initials which are here used as a symbol for the herbarium concerned: H. J. Oosting, Duke University (DU); E. West, University of Florida (FLA); W. H. Duncan, University of Georgia (GA); Miss Edith Scamman, Gray Herbarium (GH); R. M. Tryon, Missouri Botanical Garden (MBG); A. E. Radford, University of North Carolina (NC); D. D. Keck, New York Botanical Garden (NY); L. H. Shinners, Southern Methodist University (SMU); C. V. Morton, United States National Herbarium (US).

ILLINOIS: Wabash Co.: Mt. Carmel, February 15, 1900, *J. Schneck* (ILL), "taken from my well where it has been established for five years"; also April 15, 1902, *J. Schneck* (ILL). "The old fronds have been green all winter."

MARYLAND: Baltimore Co.: Camp Crestmont, Stevenson, August 24, 1941, *Elias Cohen* (US). "In rock wall of spring in tool house with glass roof (former greenhouse), deserted for over 25 years. The habitat is moist, well sheltered, yet well lighted. No competition with other plants."

NORTH CAROLINA: New Hanover Co.: dwarf specimen on a rock wall, Wilmington, July 14, 1925, *C. S. Brimley* (NC); on stone wall, Wilmington, September 1932, *Gertrude Grimsley* (DU); shady rock wall, Wilmington, May 12, 1934, *F. Smith* (DU); on old brick wall, Wilmington, April 1935, *H. L. Blomquist* (DU). Wayne Co.: Goldsboro, April 10, 1943, *E. F. Deans* (DU).

SOUTH CAROLINA: Charleston Co.: grounds of Charleston College, no date, Charleston, *A. H. Curtiss* (US, ILL, NC, GH, NY, MBG); on brick walls, Charleston, November 1873, *H. W. Ravenel* (GH); on walls of Charleston College, 1879, *E. Donor* (GH), "probably from escaped spores of cult. plants."; base of walls on the buildings of Charleston College, April 16, 1880, *J. D. Smith* (MBG, GH); Charleston, December 2, 1898, *J. H. Barnhart* 2601 (NY); in crevices of brick wall, St. Philip's churchyard, Charleston, *J. H. Pyron* (GA), no date; old burying ground opposite St. John's Church, Charleston, August 27, 1909, collector unknown (NC); crevice of wall on city street near Custom House, Charleston, May 1, 1912, *B. L. Robinson* 197 (GH); Charleston, February 5–8, 1919, *J. K. Small* (NY); on rock wall, Charleston, December 2, 1933, *Emma Richardson* (NC); growing on walls of old houses in Charleston, escaped, March 29, 1935, *D. Correll* 280 (DU). Chesterfield Co.: moist stone, side of St. David Church, Cheraw, June 8, 1940, *Mary Singletary & Dorothy Huntley* (DU). Orangeburg Co.: Eutawville, September 6–11, 1909, *W. W. Eggleston* 4992 (GH, NY). On brick work of canal wall, 2 miles from home of Thomas Walter, Santee Canal, August 29, 1909, collector unknown (NC); on Santee River, without locality, *J. K. Small* (NY), no date. Georgetown Co.: on brick house, Georgetown, December 27, 1922, *W. C. Coker* (NC).

GEORGIA: Chatham Co.: on brick wall of old vault, Bonaventure Cemetery, *J. H. Pyron & R. McVaugh* 1396 (GA), no date. Clarke Co.: naturalized at edge of dwelling, Athens, July 10, 1939, *J. H. Pyron* 544 (DU, GA). Bibb Co.: "under a barn 'in the park,' Macon," no date, *Wm. Farnell* (NY).

FLORIDA: Alachua Co.: in limestone pit, Buzzard's Roost, 7 miles west of Gainesville, August 1954, *E. West* (FLA). Citrus Co.: rock pit beside Rutland road 1 mile east of Inverness, February 28, 1935, *E. P. St. John* (FLA, GA); on rock, 2 miles southeast of Inverness, February 28, 1935, *R. P. St. John* (FLA, GH); Floral City, March 1935, *E. & R. St. John & J. K. Small* (NY). Jackson Co.: Caverns State Park, August 23, 1943, *O. E. Baynard* (FLA). Leon Co.: on moist creek bank, Gaine's Woods, Tallahassee, January 21, 1950, *Jackson & Flanders* (DU). Saint Johns Co.: St. Augustine, February 1934, *W. A. Knight* (NY); without locality, 1895, *Mrs. J. M. Hunter* (GH).

ALABAMA: Mobile Co.: on cool shaded banks of rivulets, near Mobile, May 22, 1878, *C. Mohr* (GH); Mobile, 1879, *C. Mohr* (NY); without locality, on old damp walls, and shaded sides of ditches, June 1884, *C. Mohr* (US); damp walls and ditches, Mobile, September 1893, *C. Mohr*, "fully naturalized if not indige-

nous'' (MBG); Mobile, 1904, *W. S. McNeill* (NY); adventive on damp brick walls, Mobile City, May 1905, *W. C. Dukes* (GH); without locality, old brick walls, ditch banks, September 1906, *W. C. Dukes* (FLA); Mobile, 1905, *W. C. Dukes* (GH); Mobile, January 27, 1907, *W. C. Dukes* (NY); naturalized on brick walls, Mobile, April 1938, *W. C. Dukes* (GH). Monroe Co.: on east side of bridge across Alabama River at Claiborne, no date, *L. C. Crawford* 96 (GA).

MISSISSIPPI: Adams Co.: old brick wall, Natchez, March 26, 1941, *H. Myers* (DU).

LOUISIANA: St. Martin Parish: on moist wooded bank along a small stream along the Bayou Teche, 2.5 miles south of St. Martinville, July 6, 1938, *D. S.* & *H. B. Correll* 9396 (US); West Feliciana Parish: moist wooded ravine slope, along Alexander Creek, 1.5 miles northwest of St. Francisville, August 20, 1938, *D. S.* & *H. B. Correll* 10432 and 10438 (with *C. A. Brown*) (GH, NY); on wooded steep ravine slope, about 1 mile west of Plettenberg, August 22, 1938, *D. S.* & *H. B. Correll* 10452 (GH, DU).

ARKANSAS: Garland Co.: on vertical limestone, Hot Springs, April 19, 1941, *A. Chandler* 4141 (US, MBG).

TEXAS: Hardin Co.: frequent in sandy soil at Kountze, October 27, 1944, *B. C. Tharp* 44408 (US). Jefferson Co.: a few plants at base of large trees, accidentally introduced in gardens of P. A. Winkler, Voth Road, October 3, 1945, *V. L. Cory* 49988 (SMU).

CALIFORNIA: Los Angeles Co.: crevices of granite ledges, in Santa Anita Canyon, San Gabriel Mts., alt. 1600 ft., January 24, 1942, *G. R. Proctor* (US); ''There is no possibility of its having been planted.''

NEW YORK: ''It is fond of growing on old walls as far north as New York City''—Clute (1938, p. 102).

SUMMARY

The almost wholly tropical genus *Pteris* consists of about 280 species (Copeland, 1947, p. 61), of which four are known to occur in the United States (Small, 1938, p. 100). One of these, *P. multifida* Poir., thought to be native in Asia and introduced or naturalized in southeastern United States, is discussed with the citation of herbarium specimens to show its present occurrence in eleven states, Maryland, North Carolina, South Carolina, Georgia, Florida, Alabama, Arkansas, Mississippi,

Louisiana, Texas, and California. Former spontaneous occurrence of the plants in southern Illinois, and of their possible present existence in Colorado and New York, are mentioned

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REFERENCES

Blake, S. F. 1941. State and local fern floras of the United States. Amer. Fern Journ. **31**: 81–90; 131–143.

Blomquist, H. L. 1934. Ferns of North Carolina. 131 pp. Duke University Press, Durham, N. C.

Bragg, Laura M. 1914. Preliminary list of ferns of the coast region of South Carolina north of Charleston. Bull. Charleston Museum **10**: 17–24.

Broun, M. 1938. Index to North American ferns. 217 pp. Orleans, Mass.

Brown, C. A. & Correll, D. S. 1942. Ferns and fern allies of Louisiana. 186 pp. Louisiana State University Press, Baton Rouge, La.

Burkart, A. 1933. Observaciones sobre Pteridofitas platenses. Physis **11**: 253–265.

Chandler, A. 1941. Pteris multifida in Arkansas. Amer. Fern Journ. **31**: 112.

Christ, H. 1897. Die Farnkräuter der Erde. 388 pp. Jena. —1910. Die Geographie der Farne. 333 pp.

Christensen, C. 1906. Index Filicum.

Clute, W. N. 1938. Our Ferns, ed. 2, 388 pp. F. A. Stokes Co., New York.

Copeland, E. B. 1947. Genera Filicum. 247 pp. Chronica Botanica Co., Waltham, Mass.

Correll, D. S. 1949. A preliminary survey of the distribution of Texas Pteridophyta. Wrightia **1**: 247–278.

DeVol, C. E. 1945. Ferns and fern-allies of East Central China. Shanghai.

Diddell, Mary W. 1953. Fern Notes. Amer. Fern Journ. **43**: 114–117.

Eaton, D. C. 1878. Ferns of North America, vol. 2.

Hooker, W. J. 1858. Species Filicum, vol. 2.

Jones, G. N. 1947. An enumeration of Illinois Pteridophyta. Amer. Midl. Nat. **38**: 76–126.

McVaugh, R. & Pyron, J. H. 1951. Ferns of Georgia. 195 pp. University of Georgia Press, Athens, Ga.

Mohr, C. 1901. Plant Life of Alabama. Contr. U. S. Nat. Herb. **6**: 1–921.
Schneck, J. 1900. Pteris cretica in Illinois. Bot. Gaz. **29**: 201.
Small, J. K. 1938. Ferns of the southeastern states. 517 pp. The Science Press, Lancaster, Pa.
Soxman, G. M. 1945. Pteris multifida in Texas. Amer. Fern Journ. **35**: 53.
Underwood, L. M. 1900. Our Native Ferns, 6th ed. Henry Holt & Co., New York.
Weatherby, Una F. 1952. The English names of North American ferns. Amer. Fern Journ. **42**: 134–151.

Notes on Adiantum in Mexico, I.

C. V. MORTON

The species of *Adiantum* in tropical America are numerous, although perhaps not quite so numerous as the number of names involved would indicate. The recent study of several types has allowed the clarification of some of the names based on Mexican plants.

Adiantum tenerum Swartz, Prodr. Veg. Ind. Occ. 135. 1788.

Adiantum trapezoides Fée, Gen. Fil. 117. 1852. Type from Puente Nacional, Veracruz, Mexico, *Galeotti* 6317 (Paris!).

?*Adiantum extensum* Fée, Mém. Foug. **8**: 72. 1857. Type from Orizaba and Huatusco, Veracruz, Mexico, *Schaffner* 40 and 41.

All the Mexican plants with decompound fronds with articulate segments were referred to *A. tenerum* for many years. In fairly recent times, Dr. Maxon and I segregated a number of specimens from western Mexico under the name *A. trapezoides* Fée. The rhizome scales of *A. tenerum* are small, distinctly bicolorous (the center blackish, the margins brown), and long-ciliate. The plants from western Mexico have larger rhizome scales, these concolorous, bright brown, and only a little ciliate. The leaf-segments are larger than is usual in *A. tenerum*,

and the margins of the sterile segments are subentire or only faintly denticulate.

This species from western Mexico seems surely specifically separable. However, the name *A. trapezoides* is not applicable. I examined the type in the Museum d'Histoire Naturelle in Paris and found that it is definitely *A. tenerum*. The species of western Mexico may be known as *A. princeps* Moore. These two species have distinct ranges in Mexico, *A. tenerum* being confined to the Atlantic coastal states from San Luis Potosí to Yucatán, and the other species to the Pacific states from Sinaloa to Oaxaca (including also the Revillagigedo Islands).

From description *A. extensum* Fée may be a synonym of *A. tenerum;* it is from the proper geographic area. The type was not located at Paris.

Adiantum tenerum var. *dissectum* Mart. & Gal. (Bull. Acad. Sci. Brux. **15**[5]: 71. 1842) was based on *Galeotti* 6361. I saw the type in the Jardin Botanique de l'Etat, Brussels. It does not represent a variety of *A. tenerum* but is a variety (or synonym) of the quite different *A. andicola* Liebm.

MEXICAN SPECIMENS EXAMINED:

SAN LUIS POTOSÍ: Tamasopo Canyon, *Pringle* 3360; *Pennell* 17952; Tamazunchale, *Fisher* 3795; *Edwards* 541. Los Caños, *Palmer* 269, in 1902.

VERACRUZ: Zacuapán, *Purpus* 6451. Barranca de Panoya, *Purpus* 8462. Colipa, *Liebmann.* Jalapa, *Lyonnet* 3115. Pueblo Viejo, *Palmer* 375, in 1910. Omealca, *Orcutt* 3379.

OAXACA: Cerro de la Laguna, Tuxtepec, *Conzatti* 3751.

CHIAPAS: Between El Carmen and Solosuchiapa, *Collins & Doyle* 240.

YUCATÁN: *Gaumer* 24201. Mérida, *Schott.* Chichen Itzá, *Steere* 1588.

Adiantum princeps Moore, Gard. Chron. n. ser. **4**: 197. *fig. 43, 44.* 1875.

?*Adiantum amplum* Presl, Rel. Haenk. **1**: 63. 1825. Type from Mexico, *Haenke.* Presl cites also Guayaquil, Ecuador.

Adiantum tenerum var. γ Hook. Sp. Fil. **2**: 46. 1858. Type from Veraguas, Panama, *Seemann* (fragment, US).

Adiantum trapezoides auctt., non Fée.

The differences between *A. princeps* and *A. tenerum* are discussed in the preceding entry. The type of *A. princeps* came from a plant cultivated from material originally received from Colombia. A photograph of the type specimen at the Royal Botanic Gardens, Kew, is in the National Herbarium. This species is evidently very rare in Colombia, for there is only one specimen in the U. S. National Herbarium from that country, namely *H. H. Smith* 953. It is common in western Mexico, though, and occurs also throughout Central America. It does not seem advisable to adopt the name *A. amplum* without examination of the type.

MEXICAN SPECIMENS EXAMINED:

SINALOA: Balboa, *Ortega* 5063.

COLIMA: Tuxpán Canyon, *Orcutt* 4692.

NAYARIT: Maria Madre Island, *Maltby* 87; *Nelson* 4281; *Ferris* 5704. Maria Magdalena Island, *Mason* 1822. San Blas, *Wright* 1361; *Maltby* 39. Acaponeta, *Rose, Standley, & Russell* 14315. Zopilote, *Lamb* 573. Tepic, *Palmer* 2028, in 1892.

MICHOACÁN: Pomaro, *Hinton* 15883. Aquila, *Hinton* 15956. Pihuano, *Jones* 498.

GUERRERO: Acapulco, *Palmer* 518, in 1895; *Lyonnet* 3270. Atoyac, *Hinton* 10942. Pasión, *Hinton* 10789. Soledad, *Hinton* 9894.

OAXACA: Cafetal Concordia, *Morton & Makrinius* 2647; *Conzatti, Reko, & Makrinius* 3012. Cerro Concordia, *Morton & Makrinius* 2647. Chinantla, *Liebmann* 2207. Between Huazolotitlan and Jamiltepec, *Conzatti* 4431. Cafetal Nuevo Esperanza, *Conzatti, Reko, & Makrinius* 3089. Cerro Santo Domingo, *Conzatti* 3736.

Adiantum tricholepis Fée, Mém. Foug. **8**: 72. 1857.

Adiantum fragile var. *pubescens* Mart. & Gal. Mém. Acad. Brux. **15**[5]: 72. 1842. Type from Río Grande de Lerma, near Guadalajara, Jalisco, Mexico, *Galeotti* 6445 (Brussels!).

Adiantum chilense var. *pilosulum* Liebm. Mex. Bregn. 115. 1849. Type from Papantla, Veracruz, Mexico, *Liebmann* (Isotype US!).

This characteristic species has been strangely misunderstood in the past. Specimens have been referred in the literature to such diverse species as the Chilean *A. scabrum* Kaulf. and *A. chilense* Kaulf., to the well-marked species *A. concinnum* Humb. & Bonpl. and *A. fragile* Swartz, to the Old World *A. aethiopicum* L., and also to *A. Braunii* Mett. and *A. Poiretii* Wikstr., the last mentioned being the only one that seems at all closely allied. However, the soft-pilosulous lower surface of the leaf-segments easily distinguish *A. tricholepis* from *A. Poiretii* and from all other Mexican species with decompound fronds except *A. Feei.* Outside of Mexico, the present species occurs only in southern Texas and in northern Guatemala (Petén).

MEXICAN SPECIMENS EXAMINED:

TAMAULIPAS: Victoria, *Palmer* 180, 182, 566, in 1907; *Fisher* 3321, 3324; *Runyon* 716. Hacienda Chamal, *Wooton.* Hacienda Buena Vista, Sierra de la Cocina, *Wooton.* Llera, *Peterson* 26. San José, *Bartlett* 10537. San Miguel, *Bartlett* 10640. Tampico, *Palmer* 19, in 1910.

COAHUILA: Hacienda Mariposa, *Wynd,* 691. Hacienda La Rosita, Muzquiz, *Wynd & Mueller* 296. Agua Nuevo, Muzquiz, *Marsh* 308.

NUEVO LEÓN: Near Monterrey, *Pringle* 1981.

DURANGO: La Bajada Tamazula, *Ortega* 4292.

SAN LUIS POTOSÍ: Valles, *Fisher,* 3320. Las Canoas, *Pennell* 17938.

CHIHUAHUA: Chihuahua, *Pringle* 962.

SONORA: Arroyo Gochico, east of Bernardo, *Pennell* 19518.

SINALOA: Culiacán, *Brandegee.* Lodiego, *Palmer* 1567, in 1891. Ymala, *Palmer* 1436, in 1891.

JALISCO: Barranca near Guadalajara, *Pringle* 1843; *Barnes & Land* 208; *Jones; Palmer* 74, in 1886. Tequila, *Palmer* 406, in 1886. Zapotlán, *Goldsmith* 119.

NAYARIT: Maria Madre Island, *Ferris* 5652.

MICHOACÁN: Aguila, *Hinton* 15840.

MORELOS: Xochitepec, *Lyonnet* 762.

GUERRERO: Río Balsas, *Orcutt* 4206, 4207. Iguala, *Rose, Painter, & Russell* 9286, 9418.

VERACRUZ: Pueblo Viejo, *Palmer* 376, in 1910. Baños del Carrizal, *Purpus* 6062. Rancho Remudadero, *Purpus* 16517.

CHIAPAS: El Carmén, *Münch* 72.

CAMPECHE: Champotón, *Collins* 51.

YUCATÁN: *Gaumer* 386; 24007; Chichen Itzá, *Millspaugh* 112; *Seifriz* 1, 2. Uxmal, *Schott* 687.

Adiantum Feei Moore ex Fée, Mém. Foug. **7**: 29. *pl. 24, fig. 1.* 1857.

Adiantum flexuosum Hook. Second. Cent. Ferns *pl. 61.* 1861. Type from Santa Rosa, Baja Verapaz, Guatemala, *Salvin.*

This species, mentioned above under *A. tricholepis,* is one of the most easily recognized of the Mexican Adiantums, by reason of its zig-zag, densely short-reddish hirtellous rhachises. The rhachises in *A. tricholepis* bear only a few scattered long slender hairs. The indusial flaps in *A. Feei* are glabrous but copiously pilose in *A. tricholepis.*

The type of *A. Feei* came from Orizaba, Veracruz, where it was collected by Schaffner, no. 446 (or 44b, according to Fournier). Apparently the species has not been found again in Veracruz.

The Guatemalan *A. flexuosum* is recognized as distinct in Christensen's Index Filicum, but it does not seem separable. In Guatemala, the species has been found in Alta Verapaz and Baja Verapaz, at elevations between 1200 and 1500 meters. There is in the National Herbarium a specimen labelled "Costa Rica and Veragua," collected by Warscewicz (No. 32).

MEXICAN SPECIMEN EXAMINED:

CHIAPAS: San Pablo, alt. 1600 m., *Münch* 123.

All the specimens cited above are in the U. S. National Herbarium. Examination of specimens in other herbaria might extend the ranges somewhat.

SMITHSONIAN INSTITUTION, WASHINGTON, D. C.

A Second Record for the Filmy-fern, Trichomanes Boschianum, in West Virginia

W. H. GILLESPIE

The filmy-fern, *Trichomanes Boschianum* Sturm, is an exceedingly rare plant in West Virginia and previously has been known to occur in but a single locality[1] in this state, in Wayne County. A new colony was found near Webster Springs, Webster County, on March 12, 1954, extending the range approximately 130 miles in a northeasterly direction.

The author, with the help of several high school boys, was collecting liverworts and mosses for laboratory studies when the new stand was found. The site is at the edge of an old railroad grade, which parallels a sandstone cliff, about three and one-half miles above Webster Springs on the Back Fork of Elk River. The area is about 1600 feet in elevation and is apparently subjected to both dripping and percolating water for most of the year. The filmy-fern is here growing in association with the very common liverwort, *Conocephalum conicum* (L.) Dum. which, incidentally, was starting to produce capsules at the time this collection was made.

It was a rather remarkable coincidence that these plants were saved for identification. The author admittedly did not recognize the plants, but secured the specimens because of their unusual features. Dr. Nelle Ammons[2] separated them from the collection of liverworts and in conjunction with Dr. R. C. Spangler[2] identified them as belonging to the Family Hymenophyllaceae. Upon further checking they proved to be *T. Boschianum*, an identification confirmed by Dr. Edgar T. Wherry.[3]

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[1] Plymale, Lewis. *Trichomanes Boschianum* in West Virginia. Amer. Fern Journ. 28: 122–123. 1938.

[2] Of West Virginia University Biology Department.

[3] Confirmation in letter to author, April 19, 1954.

In a subsequent field trip the fern was discovered in another nearby area. This second area is located in the bottom of a ravine where high water next spring will probably eradicate it.

Specimens are on file in the West Virginia University Herbarium, with Dr. Edgar T. Wherry in Philadelphia, and in the author's private collection.

WEST VIRGINIA UNIVERSITY

Some New Nomenclatural Combinations

A. H. G. ALSTON

The preparation of a list of the ferns cultivated in Germany requires the publication of the following new combinations:

Cyclosorus **arcuatus** (Poiret) Alston, comb. nov.
Polypodium patens Swartz, Prodr. 133. 1788. Not *Cyclosorus patens* (Fée) Copeland.
Polypodium arcuatum Poiret, in Lam. Encycl. **5**: 528. 1804.
Dryopteris patens Kuntze, Rev. Gen. Pl. **2**: 813. 1891.

Cyclosorus arcuatus var. **lepidus** (Moore) Alston, comb. nov.
Lastrea lepida Moore, Gard. Chron. n. ser. **26**: 681. 1886.
Nephrodium lepidum Baker, Ann. Bot. **5**: 318. 1891; G. Schneid. Book Choice Ferns **2**: 537. *pl.* 1893.
Dryopteris lepida C. Chr. Ind. Fil. 274. 1905.

Unfortunately, the well-known epithet *patens* is not available under *Cyclosorus*. The original plant described as *Lastrea lepida* came up in the tropical fernery of Messrs. E. G. Henderson & Son, Pine-apple Nursery, Maida Vale, London. As it was thought to be allied to *Lastrea Prenticei* Carruthers, from Fiji, it was supposed to be from Polynesia, but examination of specimens shows that it is an abnormal form of *C. arcuatus* of trop-

ical America.[1] *Lastrea Prenticei* is a *Thelypteris* and should be known as:

Thelypteris **Prenticei** (Carruthers) Alston, comb. nov.

Lastrea Prenticei Carruthers, in Seem. Fl. Viti. 359. 1873.

BRITISH MUSEUM (NATURAL HISTORY, LONDON, ENGLAND.

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[1] The fern known as *Lastrea lepida* is in cultivation in the United States, although probably sparingly. It is, or was formerly, available from the Royal Palm Nursery, Oneco, Florida. It would be a greenhouse fern only in the northern states.—C. V. M.

Additional Records of Pteridophytes from Kamchatka, Alaska and the Aleutian Islands

WALTER J. EYERDAM

My interest in the plants of the North Pacific began with collections made in Kamchatka in 1925 and larger collections made in 1928, most of which were reported in Dr. Eric Hultén's "Flora of Kamchatka." In 1929 and 1930 I made two visits to the Naturhistoriska Riksmuseet in Stockholm, and Dr. Hultén made arrangements for a joint collecting trip. Dr. Hultén was interested in studying the routes of migration to and from Asia.

In 1932 Dr. Hultén joined me in Seattle and we went north on the Coast Guard ship Tahoe. We rented a small house in Unalaska and spent May and June in working the surrounding area intensively for early flowering plants, cryptogams, and marine invertebrates. Two weeks were spent in digging into an Aleut stone-age village near Dutch Harbor for artifacts, which were sent to the Riksmuseet. Several years later, I urged Dr. Ales Hrdlicka to continue the digging where we left off, which he did and collected a harvest of desirable material for the U. S. National Museum.

In order to cover a wider area, Dr. Hultén and I separated in July and worked different areas, my assign-

ment being the eastern Aleutian Islands (Atka, Amlia, Carlisle, Unalaska, and Unimak Islands), King Cove (Alaska Peninsula), and Seldovia (Kenai Peninsula). Hultén worked in the Aleutian Islands between Unalaska and Attu, the Pribilof Islands, and some areas of the eastern and southeastern Alaskan coast. Neither of us had assistants. Collecting was under adverse conditions, as at that time the islands were very sparsely populated, many large islands being wholly devoid of human inhabitants. We usually lived in native villages or in the cabins of winter trappers on the uninhabited islands. Hultén made some ethnological collections, and I collected a series of small mammals, land birds, mollusks, both marine and terrestrial, and fishes.

The botanical results were gratifying, our joint collections reaching about 20,000 sheets, representing about 3,000 numbers. Of the 525 species and varieties of higher plants recorded from the Aleutians we found about 500 and also about 25 more that were new. Subsequent excursions by numerous collectors since 1932 have not added many more to the flora.

Since 1939, when I resumed my trade in the herring fishery industry, I have collected extensively at various places as follows:

Port Vita, Raspberry Island, Kodiak Island (1939, 1945, 1946).

Thum Bay, Knight Island, Prince William Sound (1939, 1940).

Port San Juan, Evans Island, Prince William Sound (1948).

Washington Bay, Kuiu Island (1947, 1949, 1950, 1951, 1952).

My earlier collections are cited in Hultén's "Flora of Alaska," part 1, 1941, and some of the later ones in the Supplement (part 10, 1950). The present list gives additional records, arranged according to the geographical

divisions of Hultén. Most of the identifications have been verified by Hultén. Specimens of these collections have been widely distributed to over fifty herbaria in the United States, Canada, Argentina, Uruguay, England, Sweden, Norway, U.S.S.R., Germany, and Switzerland.

POLYPODIACEAE

WOODSIA SCOPULINA D. C. Eaton. Centr. Pacif. C.D.[1]: Skagway, in rock crevice near the seashore (3312). Rare in Alaska and with a disrupted range.

WOODSIA ILVENSIS (L.) R. Brown. Kamchatka: Ustj Kamchatsk, July, 1925. Centr. Pacif. C.D.: Skagway (3315); Port San Juan (7206). Occurring in several inconstant forms.

CYSTOPTERIS FRAGILIS (L.) Bernh. Kamchatka: Ustj Kamchatsk, July, 1925. East. Pacif. C.D.: Washington Bay (5362). West. Pacif. C.D.: Old Harbor, Kodiak Isl., 1931; Port Vita (3812, 5103).

STRUTHIOPTERIS FILICASTRUM All. Aleutian Islands: False Pass, Unimak Isl., Aug. 1932 (First record for Aleutian Islands). East. Pacif. C.D.: Washington Bay (5365, 5450). Centr. Pacif. C.D.: Seldovia (2501); Thum Bay (3382, 3633); Port San Juan, Aug., 1948. West. Pacif. C.D.: Old Harbor, Kodiak Isl., (624, 654); Three Saints Bay, Kodiak Isl. (449, 493, 512); Port Hobron, Sitkalidak Isl. (171); Port Vita (4028).

DRYOPTERIS AUSTRIACA (Jacq.) Woynar. East. Pacif. C.D.: Washington Bay (5450). Centr. Pacif. C.D.: Port Vita (3339, 4028); Thum Bay (3300, 3501, 3634); Port San Juan (3585, 7138, 7221).

DRYOPTERIS DISJUNCTA (Ledeb.) Morton. Port Vita (5112).

DRYOPTERIS OREOPTERIS (Ehrh.) Maxon. Centr. Pacif. C.D.: Thum Bay (3275).

DRYOPTERIS PHEGOPTERIS (L.) C. Chr. Centr. Pacif. C.D.: Raspberry Isl. (3215); Evans Isl. (7120).

DRYOPTERIS PHEGOPTERIS var. CRUCIATA (Kaulf.) C. Chr. Kamchatka: Ustj Kamchatsk, July, 1925.

POLYSTICHUM BRAUNII (Spenner) Fée. Centr. Pacif. C.D.: Thum Bay (3578).

POLYSTICHUM LONCHITIS (L.) Roth. East. Pacif. C.D.: Washington Bay (5371, 5382).

POLYSTICHUM MUNITUM (Kaulf.) Presl. Centr. Pacif. C.D.: Port San Juan (7192). A single plant was found in a rock

[1] C.D. stands for Coastal District.

crevice near a mountain top; it must be a rare species, for this is the only plant I have ever found in Alaska.

ATHYRIUM FILIX-FEMINA (L.) Roth subsp. CYCLOSORUM (Rupr.) C. Chr. Kamchatka: Ustj Kamchatsk, July, 1925. East. Pacif. C.D.: Washington Bay (5452); Centr. Pacif. C.D.: Port San Juan (7122); Thum Bay (3381). West. Pacif. C.D.: Port Vita (4027).

ASPLENIUM VIRIDE Huds. East. Pacif. C.D.: Washington Bay (7438, 7562), in rock crevices of cliff in forest. Centr. Pacif. C.D.: Port San Juan (7199). This is a rare species in Alaska.

BLECHNUM SPICANT (L.) With. East. Pacif. C.D.: Washington Bay (5368, 7548, 7556, 8016). Centr. Pacif. C.D.: Thum Bay (3388, 3589). Common in spruce-hemlock forest in southeastern Alaska.

CRYPTOGRAMMA CRISPA (L.) R. Brown subsp. ACROSTICHOIDES (R. Brown) Hultén. Centr. Pacif. C.D.: Thum Bay (3495); Port San Juan (7190). West. Pacif. C.D.: Port Vita (5248).

ADIANTUM PEDATUM L. var. ALEUTICUM Rupr. East. Pacif. C.D.: Washington Bay (5430, 5492). Centr. Pacif. C.D.: Thum Bay (5055).

PTERIDIUM AQUILINUM (L.) Kuhn subsp. LANUGINOSUM (Bong.) Hultén. West. Pacif. C.D.: Washington Bay (7404). Only one specimen was found in the area around Washington Bay during six summers in which the district was intensively worked. The specimens (reported by Hultén) that I found on Annette Island were depauperate and not common.

POLYPODIUM VULGARE L. var. OCCIDENTALE (Hooker) Hultén. East. Pacif. C.D.: Skagway (3333); Washington Bay (5357). Centr. Pacif. C.D.: Port San Juan (7194). West. Pacif. C.D.: Port Vita (3214, 3684).

OPHIOGLOSSACEAE

OPHIOGLOSSUM VULGATUM L. var. ALASKANUM (E. Britt.) C. Chr. Aleutian Islands: Unalaska Village, Unalaska, Sept., 1932.

EQUISETACEAE

EQUISETUM ARVENSE L. West. Pacif. C.D.: Port Vita (3771). Centr. Pacif. C.D.: Thum Bay (3347).

EQUISETUM FLUVIATILE Ehrh. (syn. *E. limosum* L.). West. Pacif. C.D.: Port Vita (3123, 3873, 4037).

EQUISETUM HYEMALE L. Kamchatka: Petropavlovsk, Aug. 1, 1928.

EQUISETUM VARIEGATUM subsp. ALASKANUM (Eaton) Hultén. East. Pacif. C.D.: Juneau (7290).

LYCOPODIACEAE

LYCOPODIUM ALPINUM L. Kamchatka: Ustj Kamchatsk, July, 1925. East. Pacif. C.D.: Washington Bay (7467); Air Landing Field, Annette Isl. (7450). Centr. Pacif. C.D.: Thum Bay (3308, 3359, 3640).

LYCOPODIUM ANNOTINUM L. Kamchatka: Avatschinskaja Volcano, Aug. 25, 1928. East. Pacif. C.D.: Washington Bay, 1947; Air Landing Field, Annette Isl. (5505 p.p., 5506). Centr. Pacif. C.D.: Thum Bay (3272). West Pacif. C.D.: Port Vita (4043).

LYCOPODIUM ANNOTINUM L. var. PUNGENS (LaPylaie) Desv. Centr. Pacif. C.D.: Thum Bay (4610). Merging into var. *alpestre*.

LYCOPODIUM CLAVATUM L. Centr. Pacif. C.D.: Thum Bay (3575).

LYCOPODIUM CLAVATUM L. var. MONOSTACHYON Hook. & Grev. West. Pacif. C.D.: Port Vita (3951). Determined by J. P. Anderson.

LYCOPODIUM OBSCURUM L. East. Pacif. C.D.: Air Landing Field, Annette Isl. (7446).

LYCOPODIUM SABINIFOLIUM Willd. var. SITCHENSE Rupr. East. Pacif. C.D.: Washington Bay (5382). Centr. Pacif. C.D.: Thum Bay (3577, 3649).

LYCOPODIUM SELAGO L. East. Pacif. C.D.: Washington Bay (5366, 5475, 7343, 7428, 7437, 8015); Annette Isl. (5505 p.p.). Centr. Pacif. C.D.: Thum Bay (3239, 3296, 3408, 3576). West. Pacif. C.D.: Port Vita (3960).

SELAGINELLACEAE

SELAGINELLA SELAGINOIDES (L.) Link. Centr. Pacif. C.D.: Port San Juan (7255).

ISOËTACEAE

ISOËTES BRAUNII Durieu. Centr. Pacif. C.D.: Port San Juan (7116, 7226, 7276).

SEATTLE, WASHINGTON

Shorter Notes

WHAT FERNS ARE THESE?—In the story "South Korean Prisoner in North Korea," by Mary Kilin, which has been running in the New York Herald-Tribune, occurs the following passage: "Throughout the spring we

were issued as part of our food a sort of tasteless fern known as 'kosar.' We could not get away from it, and finally the very sight of it revolted us. We gave it away to the villagers, trading it for almost anything they would give us. One day in June, the commandant was not in too good spirits when we reported to him for our rations. 'From now on,' he said, 'you are going to get nothing but kosar.' '' Can any reader identify this ''kosar''?

Another question of identification is posed by references to some fern as a cleaning agent in the story ''Oh, Promised Land,'' by James Street. Of a prospective bride, it was said, ''We'll wash your hair in fern soap.'' The action of the story takes place in pioneer days in Georgia.—R. C. Benedict.

THE TYPE OF BLECHNUM CARTILAGINEUM.—*Blechnum cartilagineum* Swartz was described[1] as being from ''Nova Hollandia,'' i.e. Australia. It is a well known and rather common species in Australia. There has been however a little uncertainty concerning the proper name, for Swartz himself[2] later remarked that his plant had not come from Australia but from ''Cayenne,'' i.e. French Guiana, and that it probably was not the same as the Australian plant going under the name *cartilagineum*.

Through the kindness of Dr. O. Selling, I was privileged to study the type of *B. cartilagineum*. It is labelled in Swartz' hand ''*B. cartilagineum* S. Syn. e. Cayenna (*ex captis anglis facta*). *B. serrulatum* Richard Act. Paris 1?.'' The specimen does not agree at all with *B. serrulatum* or with any material from French Guiana or tropical America, but is a close match for specimens from Australia that are commonly identified

[1] In Swartz, Syn. Fil. 114, 312. 1806.
[2] Adnotationes Botanicae 69. 1829.

as *B. cartilagineum*. Thus it is certain that the original locality "Nova Hollandia" was correct, and that the data on the label are erroneous.—C. V. MORTON.

THE GLANDULAR FORM OF THE OAK FERN.[1]—In 1939, R. M. Tryon, Jr., described a glandular form of *Dryopteris linnaeana* based on specimens from Wisconsin and Washington. *D. linnaeana* has since been included in the synonomy of *D. disjuncta*, but the form has apparently not been transferred to that species. The inclusion of this form in a forthcoming paper on the ferns of the Ottawa district necessitates the following transfer:

Dryopteris disjuncta (Ledeb.) C. V. Morton forma **glandulosa** (Tryon) Cody, comb. nov.

D. linnaeana C. Chr. forma *glandulosa* Tryon, Amer. Fern Journ. **29**: 4. 1939.

One specimen has been collected in the Ottawa District: One mile east of Hawthorne, Gloucester Twp., Carleton County, Ontario, *H. A. Senn* 1906 (DAO).—W. J. CODY, *Canada Department of Agriculture, Ottawa, Ontario.*

DRYOPTERIS SETIGERA TO BE FOUND IN GEORGIA?—The ferns of Florida seem to be gradually pushing northward. I have found *Phlebodium aureum* in Baker County, Florida, which is on the border of Georgia, and this species has recently been reported from Georgia. The most northerly station reported for *Dryopteris setigera* has been St. Johns County, Florida, but I have recently found this species in both Baker and Nassau Counties. In the latter county, the station is within 300 yards of the Georgia State Line, so it seems likely that this species will be found in Georgia within a very short time.—WILLIAM F. OLIVER, JR.

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[1] Contribution No. 1437 from the Botany and Plant Pathology Division, Science Service, Canada Department of Agriculture, Ottawa, Ontario.

SHOULD THE AMERICAN HART'S-TONGUE BE INTERPRETED AS A DISTINCT SPECIES?—The recent range extensions of the American Hart's-tongue by Hagenah and the cytological discoveries concerning this plant by Britton have once again focussed attention on this rare plant. Dr. Áskell Löve, of the Department of Botany, University of Manitoba, Winnipeg, Canada, has recently discussed it[1] and has made some proposals that will most certainly arouse the attention of pteridologists. Because of the distinct morphology and ecology of the American Hart's-tongue as originally revealed by Fernald, and the distinct cytology ($2n = 144$ rather than the $2n = 72$ of the European plants, as recently shown by Britton), Dr. Löve proposes that the American plant be treated as a distinct species, *Phyllitis Fernaldiana* Löve, nov. spec., rather than as a variety, *P. Scolopendrium* var. *americana* Fernald.

For the present, at least, I submit that such action may be questionable, for the following reasons: (1) The existence of autopolyploidy *per se* within species is already well known among ferns, not less than 18 species having been shown to possess multiple numbers, including such familiar plants as *Cystopteris fragilis*, *Polypodium vulgare*, *P. virginianum*, and *Asplenium Trichomanes*. In these cases I believe that the polyploid populations should be treated as varieties or subspecies, in spite of the reproductive isolation that attends polyploid cytological differences. Otherwise, we may end up with a species taxonomy burdened with numerous "species" differentiated on the basis of minute and impracticable characters such as cell-size and chromosome number, the polyploid "species" being essentially like the diploids phylogenetically and genetically, except for the differ-

[1] Löve, Áskell. Cytotaxonomical Remarks on some American Species of Circumpolar Taxa. Svensk. Bot. Tidskr. **48**: 211–232. 1954.

ence in chromosome number and sufficient tendency toward bivalent formation accumulated to maintain normal spore-production. (2) The characters which Fernald used to differentiate the American variety are extremely trivial ones within the family Aspleniaceae and certainly not coordinate with characters used for species-discrimination within this genus. The subtle morphological characters combined with the well-known narrowness of ecological tolerance of the American plant do indeed justify, in this reviewer's opinion, Fernald's varietal treatment, but not the specific separation proposed by Löve.

Löve states that the "European *Ph. Scolopendrium* in its strict sense is an octoploid plant with $2n=72$ chromosomes as reported by Manton (1950)." However, I am unaware that Manton reported this species as an "octoploid" and would question that it is an octoploid. In my opinion the plant might equally well be interpreted as 6-ploid or 12-ploid. I believe that the base number of the genus *Asplenium* at this time is 36 and that the number of $2n = 72$ should be regarded as diploid until considerably more information as to ancient chromosome numbers in the ferns comes to light. $2n = 144$, by the same token, appears on present evidence to be a tetraploid number (rather than "sexdecimploid" as interpreted by Löve).—W. H. WAGNER, JR., *University of Michigan.*

JAPANESE VARIEGATED FERN AGAIN.—Mr. Walter Allen's note in the last number of the Fern Journal on *Athyrium Goeringianum* f. *pictum* on Long Island brings to mind a recent trip to Connecticut. On May 28, 1955, a contingent of the Connecticut Botanical Society visited the Canton Natural History Museum, in Canton, Connecticut. On the nature trail maintained by Mrs. William C. Riddle, the Director, is a small but thrifty colony of this fern. It was planted out several years ago and is now fully established.—JESSE F. SMITH.

Recent Fern Literature

Two papers on the formation of fern spores may be noted.[1] Fern spores (and pollen grains) are described as of two types: (1) reniform (or diplanate), and (2) sphaerotetrahedral (or triplanate). As Dr. Marengo observed it, in the first type, represented by *Onoclea*, the nucleus of the spore-mother-cell divides and a wall is formed, giving a result comparable to the splitting of an apple into halves lengthwise. The wall formed after the second nuclear division is at right angles to the first. This results in tetraspores each with two flat surfaces; later growth and the addition of surface layers and markings may somewhat obscure the diplanate shape.

In the second type, as represented by *Osmunda*, the two nuclear divisions take place before any walls are formed. The four nuclei arrange themselves equidistantly from each other and wall formation then begins. The result is four spores each with three flat contact surfaces; each spore shows a triradiate ridge marking the meeting lines of the three surfaces.

Dr. Marengo's paper is primarily concerned with the behavior of the cytoplasmic inclusions termed mitochondria. Masses of these are formed which migrate to the planes along which the future walls are to be formed. The masses, at first single, split and the new wall is laid down between the layers of mitochondria. It is to be noted that Dr. Lenette Atkinson (in the Manual of Pteridology) noted the massing of mitochondria preceding spore formation but without special mention of the connection with wall-formation.—R. C. B.

---

[1] Marengo, Norman P. A Study of the Cytoplasmic Inclusions During Sporogenesis in Onoclea sensibilis. Amer. Jour. Bot. **36**: 603–613. 1949; The Relation of Cytoplasmic Inclusions to the Establishment of Tetrahedral Symmetry in the Spore Quartet of Osmunda regalis. Bull. Torrey Bot. Club **81**: 501–508. 1954.

An Introduction to Palaeobotany. By Chester A. Arnold. McGraw-Hill. 1947.—The most fundamental findings of the twentieth century regarding the classification of living ferns have resulted from studies of fossil ferns several hundred million years old. The text being reviewed, several years old now, but not previously noted in the Journal, is designed to accompany a graduate course in palaeobotany; it is an excellent reference work for the data on which the newer conclusions have been based. Dr. Arnold, Professor of Botany and Geology at the University of Michigan, presents an outline of the new and older classifications, and follows this with fifteen other chapters detailing the evidence and conclusions.

These general conclusions regarding the classification of vascular plants as a whole have been repeatedly presented since 1900 by various authors. Briefly, they involve uniting all plants with woody or vascular tissues into a single division that is usually designated Tracheophyta. This union finds its basis in a belief that vascular tissue stands as a unifying basis, analogous to the skeleton of vertebrate animals. They further involve the discarding of the older "pteridophyte" and "spermatophyte" concepts as a natural basis for the subdivision of vascular plants. Instead, four separate and distinct classes are recognized: (1) the Pteropsida, to include true ferns and the higher seed and flowering plants; (2) Lycopsida, for the lycopods and their extinct ancestors; (3) Sphenopsida, for the horsetails and their extinct forbears; and (4) Psilopsida, with two living examples, *Psilotum* of the tropics including Florida and *Tmesipteris*, of the Australasian regions. The bases for this recognition of four main groups depends both on the comparative study of living types and of older extinct forms, and on the fact that these four can be traced back to the mid-Palaeozoic as separate and dis-

tinct lines. Furthermore, seeds are not the exclusive property of the kinds of plants which have been made the basis of the older "spermatophyte" division; not a few palaeozoic lycopods possessed seeds. For details, readers are referred to the chapters of the Arnold text.

Reference may also be made to a number of well-known writings and texts distributed over more than a half century. English botanists during the first two decades were chiefly responsible for the presentation of the newer classification. E. C. Jeffrey, then at Harvard but a transplanted Canadian, made the first proposal, which was to divide vascular plants into two subgroups, Pteropsida and Lycopsida. Further discoveries, including rich finds of additional fossils as far back as the Silurian, led to the subdivision of Jeffrey's Lycopsida into the three groups named above. His Pteropsida remained as he had proposed it, with the ancient fern group recognized as the presumptive ancestral type of our seed plants of today.

Lang, Kidston, Scott, and Oliver were the most important contributors to the new developments during the first two decades of the century. Among the expanded collections of early fossils there were found a goodly number in such an excellent state of preservation that the minutest features of cell structure, even of cell wall layers could be detected. D. H. Scott described and figured germinating fern spores, inside a sporangium with well-defined walls. One report by Oliver and Scott constituted a great blow to the supposed predominance of real ferns as the chief basis of coal formation—the identification of what had been recognized as a disconnected seed (*Lagenostoma*) with leafy structures with typical fernlike divisions (*Lyginopteris*). Thereafter, many supposed ferns came to be classified in a new class, the pteridosperms, or seed-ferns. But true ferns continued to be recognized, including several families now

extinct as well as representatives of modern osmunda, adder's-tongue, and other living groups.

The Arnold text sticks closely to the fossil representatives of the various classes of vascular plants treated and has the advantage of being the most recent treatment of the subject. Some earlier texts which deal with both living and fossil plants may be cited for reference: Bower, The Ferns (1923–28); Bower, Primitive Land Plants (1935); Eames, Morphology of Vascular Plants, Lower Groups (1936); and Manual of Pteridology (1938).—R. C. BENEDICT.

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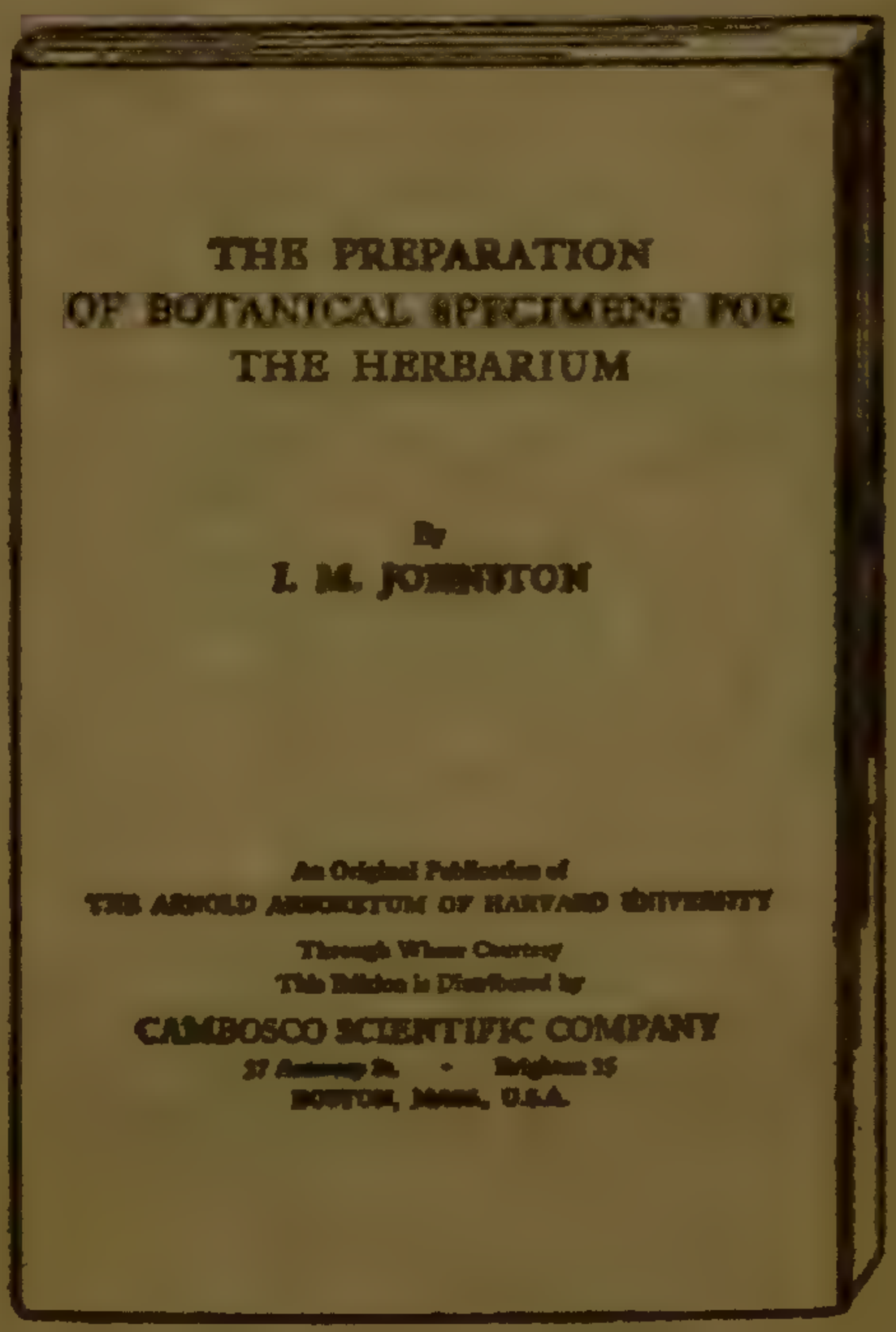

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American Fern Journal

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Campbell Easter Waters: 1872-1955

R. C. Benedict

Dr. Campbell Easter Waters, the last remaining of the original founding members of the American Fern Society, died in his sleep at his home in Washington on Friday, July 29, 1955. Because of the warmly appreciative and informative account of his life in a recent number of the American Fern Journal[1] there is no need to give an extensive biography. A few paragraphs are given here out of an acquaintance with him that began over 50 years ago when I acquired a copy of his much-admired book "Ferns," reached an "active correspondence stage" some ten years later, and which was finally capped by a visit to his home in 1953.

A freshman in college when he responded to the call for the formation of a fern society in 1893, he had already made ferns his chief hobby for some years, and had continued to work with them while pursuing active preparation for his life work in chemistry. Perhaps his first project with ferns was the working out of a key to the local species based on stipe characters. First circulated in manuscript among Fern Society members, the key was later published in 1895 as a portion of the Johns Hopkins Circular no. 119. The key was a piece of original comparative research on a subject which seems to have been previously untreated, even in technical Amer-

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[Volume 45, No. 3, of the Journal, pp. 93–132, was issued August 18, 1955.]

[1] By Donovan S. Correll, Amer. Fern Journal. 43: 137–149. 1953 (photograph).

ican or European literature. For the first number of the Linnaean Fern Bulletin, Waters contributed the lead article, a perceptive report on the carriage of the leaves of *Dryopteris cristata* as observed in the field and after transplantation to a garden. This, as did everything he wrote on ferns, showed his keen scientific attitude. His book on the ferns of the northeastern states, titled simply "Ferns,"[2] has always seemed to me the best single volume on these plants, ranking next to D. C. Eaton's classical two-volume work on ferns, publication of which was completed in 1880.

Through the years that followed, ferns continued to be the main avocational interest of Dr. Waters, involving frequent field trips, and occasional publications, in the Fern Bulletin, in Plant World, and later in the American Fern Journal. Beyond these, he expressed his interest in numerous letters, often as comments on fern articles, some of which contained extensive citations of literature, offered as helpful supplementary references.

In 1937, he was elected the fourth Honorary Member of the Fern Society. In the list of such members which has now reached a total of ten, he bears the distinction of being the only one whose professional work was not in botany. That the honor was well deserved, both because of his contributions to fern study, and for his service to the Society, no one would question. His own response, then and more recently, was characteristic of his modest personality. Following his election, he wrote an article, "Finding Ferns,"[3] which gave the high spots of his fern study through 50 years. His first sentence reads, "About two years ago, the Society unexpectedly and graciously put me on the shelf." Although exempt from paying any further dues, he then began to make a yearly dona-

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[2] Holt and Company. 1903.
[3] Amer. Fern Journ. **29**: 125–132. 1939.

tion of five dollars anonymously. Our Treasurer informs me that his latest donation was made in 1954.

More recently, in a letter received this year, after giving his opinion that Honorary Membership should be conferred only on those who have done outstanding scientific work with ferns, he went on to say, "I have never felt quite at ease about being an honorary member myself. I have always wondered why this honor was conferred on me. I have at times been embarrassed by the feeling that I was sailing under false colors. This is not just talk."

Although the Fern Society has never formulated precise criteria for the selection of honorary members, there can be little doubt that the work and service of Campbell Easter Waters constitute entirely adequate criteria in themselves.

The Ostrich Fern as an Edible Plant: A Second Note

S. F. BLAKE

About a dozen years ago, I published in this journal[1] a paper giving at some length the history of the use of the croziers of the ostrich fern[2] as an edible plant, particularly in northern Maine. My own single experience with it at that time had not been a particularly happy one; the eating of the remainder of two jars of "fiddleheads" which had been kept for two days in the refrigerator had produced violent symptoms of allergy, although the first of them had been eaten with relish and impunity. At the time the doctor who was called had diagnosed the case as one of food-poisoning, but another who was con-

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[1] Amer. Fern Journ. **32**: 61–68. 1 *fig.* 1942.

[2] Then called *Pteretis nodulosa* (Michx.) Nieuwl., now *Matteuccia struthiopteris* var. *pensylvanica* (Willd.) Morton.

sulted later had suggested that it might have been a case of anaphylaxis, susceptibility to a specific protein, the symptoms being brought out the second time I ate the plant. Some years later (1950) Wallace R. Gerow, of Houlton, Maine, who in 1935 had sent me the two original glass jars of home-preserved fiddleheads, sent me two cans of them put up commercially by the firm of La Coopérative Agricole de Baker Brook Ltée., in Baker Brook, New Brunswick. The label, in French and English, indicated that each can contained 20 ounces of "Stella brand fiddleheads" ("marque Stella fougères"), standard quality, ungraded as to size, and it had on each side a picture of a group of the young croziers.[3] My family and I ate the contents of one can soon after, without any ill effects, and a couple of years later two well-known fern students, Conrad V. Morton and Dr. Rogers McVaugh, assisted in consuming the remaining can, finding it, as W. T. Hornaday long ago remarked of the banana, "harmless and most excellent food." So that it seems quite clear that my unpleasant experience back in 1935 had been due to eating preserved ostrich ferns which had "turned" owing to imperfect refrigeration, and that under normal conditions they are as wholesome as any other food prepared in the same way.

Curiously enough, the closely allied European representative of our ostrich fern, *Matteuccia struthiopteris* (L.) Tod., apparently is not eaten, or, if it is, the practice is extremely local and unpublicized, as had indeed been the case with our own plant until recent years. At any rate, no such use is mentioned in Sturtevant's Notes on edible plants, Bois' Les plantes alimentaires, Hegi's Illustrierte Flora von Mittel-Europa, Lawalrée's treatment of Pteridophyta in the new Flore générale de Belgique, Mattirolo's Phytoalimurgia pedemontana, or the

[3] One of these labels, together with some of the contents of the can, has been placed in the U. S. National Herbarium.

work Poleznye rasteniia SSSR [Useful plants of Russia] edited by M. M. Il'in and G. B. Pigulevskii.

The earliest mention of the use of the young fronds of our ostrich fern as a potherb appears to have been made simultaneously in two brief notes published in this Journal in 1933,[4] by J. H. Schaffner and Rachel L. (Mrs. Frank E.) Lowe respectively, both having been called forth by an article in an earlier number[5] by H. E. Ransier, in which he referred to an unidentified "fiddlehead" which a guide at Madison, Somerset Co., Maine, had told him he gathered by the bushel in the spring to sell as greens. Mr. Ransier suspected it to be *Osmunda claytoniana*, because the guide had described it as "smooth." Schaffner stated that "the 'fiddle-heads' or young petioles [sic] of all three of our Osmundas . . . are used as potherbs," as well as young leaves of eagle fern [*Pteridium aquilinum*] and ostrich fern. His reference to the ostrich fern evidently rested on information obtained from others or on some printed reference which has escaped my search, for he says that he himself had eaten only the eagle fern. Mrs. Lowe, on the basis of information furnished by a guide at Fish Lake and Red River in Aroostook County, pointed out that the fiddlehead of northern Maine was the ostrich fern. In 1941,[6] in a brief paper on edible ferns in general, W. N. Clute devoted a paragraph to the commercial canning of ostrich fern at Brunswick, Maine, basing his notice on data furnished by Mr. Gerow.

Such a use is not mentioned by various earlier and later works which deal with or mention edible plants in the general region where it occurs, such as Provancher's Flore canadienne, Victorin's Flore laurentienne, Prest's Edible wild plants of Nova Scotia, Rousseau's papers on

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[4] 23: 65.
[5] 22: 135. 1932.
[6] Amer. Botanist 47: 115.

the ethnobotany of several areas in Quebec, Scribner's (1874) and J. M. H. Morrell's (1901) papers on the useful plants of Maine, Waugh's Iroquois foods, and Yanovsky's Food plants of the North American Indians. O. P. Medsger, in his Edible wild plants,[7] reports: "The stout scaly rootstocks were cooked, boiled, or roasted and eaten by the Abnaki Indians of northern New England and Quebec," but he says nothing about the eating of the fronds.

PLANT INDUSTRY STATION, BELTSVILLE, MARYLAND.

A Red-letter Day in South Carolina

THOMAS DARLING, JR.

Not long ago, while looking over the fern collection of Mr. Frank N. Irving, of Washington, D. C., which includes some of the rarest ferns of Florida and the deep South, I was especially intrigued by his description of a recent trip to the mountain areas of Oconee and Pickens Counties, South Carolina. Having long specialized in collecting the rarer species of *Asplenium* in the United States, I was particularly interested in hearing Mr. Irving's account of a visit to the Whitewater River station for *A. monanthes* in Oconee County, in the extreme northwestern part of South Carolina near the North Carolina boundary. A number of beautiful specimens of this fern were included in his collection. Its original discovery at this locaion by Rev. A. Rufus Morgan was announced in the Fern Journal by H. L. Blomquist in the memorial issue to Dr. Maxon.[1] *Asplenium monanthes* is remarkable for the fact that, prior to its discovery in South Carolina, this tropical spleenwort was known in the United States only from southeastern Arizona. It

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[7] p. 167. 1939.

[1] Amer. Fern Journ. 38: 171–176. 1948.

has recently been found in North Carolina, further north along the Whitewater River.[2]

Mr. Irving spoke enthusiastically of the wild beauty of the terrain, of steep hemlock-covered bluffs, of shaded ravines, and of the difficult going encountered in reaching this unusual fern. Since two of the Filmy Ferns, *Hymenophyllum tunbridgense* and *Trichomanes petersii,* had been discovered previously in Pickens County not far away,[3] and since I had never seen either of these species, I decided to drive from Washington to South Carolina in mid-November, 1954, to spend a day fern hunting in Oconee and Pickens Counties.

I reached Salem, South Carolina, early in the evening on Thursday, November 11, and looked up a local guide. Friday dawned clear and frosty. At an early hour we had reached (by automobile) a point along the Whitewater River where the dirt road came to an end, and from here we proceeded on foot along the creek-bed in a general northerly direction. The terrain was incredibly rough, and we threaded our way over and around gigantic boulders. After traversing the creek-bed for a considerable distance, we encountered a small tributary to our left, a little stream cascading down over the rocks at a point which my guide informed me was known as Smoke Rock Falls. The autumn coloring being now at its height, this wild mountain region of South Carolina was even more beautiful than I had imagined.

I was trying to follow the instructions given in the Fern Journal in an effort to relocate the original colony of *Asplenium monanthes:* "In small cool shaded ravine in hemlock-hardwood cove on steep bluff along Whitewater River, one mile above confluence with Thompson River, Oconee County, South Carolina." Thus far, although I had examined many rock-ledges along the way,

[2] Journ. Elisha Mitchell Soc. **68**: 81–83. 1952.
[3] Amer. Fern Journ. **30**: 21–27. 1940.

there appeared to be no sign of *A. monanthes*, but at the base of Smoke Rock Falls, I discovered some sterile fronds of a spleenwort which bore a resemblance to the fern I was seeking. The single plant grew on a vertical rock, and I collected the specimen (along with what appeared to be a liverwort at the base) for future identification. Later, when I showed this plant to C. V. Morton, he said, "Yes, these sterile fronds do resemble *A. monanthes*, but look at the base! There you have some good specimens of *Trichomanes petersii*. And some are even in fruit!" I had not previously noticed this inconspicuous fern—another example of a rare plant collected accidentally.

After leaving Smoke Rock Falls, we proceeded downstream, paralleling the Whitewater River, and soon encountered a hemlock grove on a steep bluff which seemed to coincide with the description given for the locality for *A. monanthes*. In this region we did discover a number of fertile plants of this rare tropical spleenwort, mostly growing in rich leaf-mold on the forest floor at the base of rock-ledges. Although somewhat resembling *A. platyneuron* and *A. resiliens*, *A. monanthes* can be readily distinguished by the erect fronds, closely set pinnae, similar sterile and fertile fronds, and by the peculiar soral arrangement, the sori being borne mostly on the lower side of the midrib of the pinnae instead of on both sides, and being set parallel to the lower margin of the pinnae.

Next we began a search for the Tunbridge Filmy Fern, discovered for the first time in the United States in 1935 by Mary Taylor, in Pickens County, South Carolina,[4] and rediscovered there in 1939 by Correll, Wherry, and J. E. Benedict.[5] Following my guide's directions, we found our way along the Eastatoe Creek to a point where the stream makes a sharp bend in a deep gorge. Here, on a vertical rock face beside the stream, we found

[4] Journ. Elisha Mitchell Soc. 54: 345–348; Science 88: 402. 1938.
[5] Amer. Fern Journ. 30: 21–27. 1940.

Hymenophyllum tunbridgense, adversely affected by the severe drought of 1954.[6] Most of the plants on the rock-wall were badly shriveled and dried up, and only a few close enough to the ground to absorb moisture were worth collecting.

In the late afternoon came the most astonishing discovery of the day. My guide, who was a timber marker for a lumber company, told me of an unusual fern that he had observed on his daily rounds. We drove over one of the newly constructed lumber roads to Laurel Fork Creek, in Pickens County. Here, west of Rocky Bottom and east of a field known locally as "Horsepasture," because the Confederate soldiers pastured their horses in this remote spot to save the animals from capture during Sherman's march to the sea, is a vertical cliff, approximately 15 feet high and 50 feet long, which is kept moist by spray from a nearby waterfall and by seepage from the cliff itself. This entire vertical area was covered by a dense mat of *Trichomanes boschianum*, the American Bristle Fern, the most showy of our filmy ferns. The individual fronds, which measure six inches or more in length, arise from black vine-like rhizomes closely fastened to the shallow substratum. Intensive search revealed only three fertile fronds. Here again the ravaging effects of the drought were in evidence, for nearly a third of this remarkable display was dry and lifeless looking. My companion told me that earlier in the season the entire face of the cliff had presented a colorful mass of greenery.

From the published records, this appeared to be the first locality known for this fern in South Carolina.[7]

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[6] According to a communication from Dr. Lewis E. Anderson, my station is slightly down-stream and on the other side of the stream from Mrs. Taylor's original site. The original, and most luxuriant colony, was exterminated some time during the war years by plant collectors, and not a plant remained when he visited the site in 1948, prior to the drought.

[7] It is known not far away in Macon and Polk Counties, North Carolina. Cf. Journ. Elisha Mitchell Soc. 54: 349–350. 1938.

However, a letter from Dr. Wherry advises me that there is a specimen in the herbarium of the Academy of Natural Sciences, Philadelphia, collected at Tomassee Falls, Oconee County, South Carolina, May 5, 1906, by Dr. Homer D. House.[8] An enquiry to Dr. Lewis E. Anderson has brought the surprising news that he and Mr. Thomas T. Bannister have collected *T. boschianum* from the same locality as mine on the Laurel Fork Creek, and also at Reedy Cove Falls, near Nimmons; their records have not been published.

Despite this new information, it may still be truly said that *T. boschianum* is one of the rarest ferns of South Carolina. Unfortunately, it is to be feared that the new road which has been cut through this wild and rugged terrain may cause great damage, for it runs so close to the cliff that several felled trees were nearly touching it. I noticed that the late afternoon sun was shining directly on the *Trichomanes*, where trees felled during the construction of the road had formerly provided shade. Few ferns would remain unaffected by such a change in conditions, and filmy ferns are particularly in need of shade and moisture. Still, it is probably true that far worse than the effect of droughts and lumbering on the various unusual plants of this fabulous area are the ravages of over-zealous and thoughtless collectors, which have led to the near-extermination of some of the rarest species. For such vandalism there is no excuse.

And so ended a red-letter day, which had revealed one exceedingly rare *Asplenium*, and three filmy ferns not ordinarily seen by the fern enthusiast.

382 37TH PL., S.E., WASHINGTON, D. C.

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[8] Dr. Anderson writes that all of Dr. House's specimens bear the label "Tomassee Falls," but that he has visited Tomassee Falls and considers it an unlikely habitat for filmy ferns. Dr. House told him once that he had visited Reedy Cove Falls (known locally as "Rock Falls"), and that he had found *T. boschianum*. He wonders if Dr. House's specimens were really collected there rather than at Tomassee Falls.

The Pteridophytes of Jackson County, Illinois

ROBERT H. MOHLENBROCK

This paper, the result of studies in the field and in the herbarium during the past few years, enumerates the Pteridophyta of Jackson County, Illinois, and gives ecological information concerning them. The distribution in the southern 16 counties of Illinois is given for the rarer species.

Probably the first person to collect pteridophytes to any extent in southern Illinois, particularly Jackson County, was George Hazen French, during the period between 1870–1885, although Frederick Brendel in 1860 and George Vasey in 1862 had made some collections in Johnson, Union, and Jackson Counties. A. B. Seymour, in 1880 and 1881, collected in Jackson and Union Counties. It was he who discovered the only known station in southern Illinois for the New York Fern (*Dryopteris noveboracensis*). During the same period, F. S. Earle was making collections around Cobden (Union County). In 1919, E. J. Palmer botanized extensively in Gallatin, Pope, Alexander, and Hardin Counties, finding, for the first time in Illinois, *Ophioglossum engelmannii* Prantl.

Following Palmer came southern Illinois' most ardent student of ferns, Miss Mary Steagall. Associated with Southern Illinois Normal University (now Southern Illinois University), Miss Steagall collected many specimens of ferns throughout the area, concentrating particularly on parts of Jackson and Pope Counties. It was in the latter county that she discovered the rare Filmy Fern (*Trichomanes boschianum*).

During 1940 and 1941, John McCree collected a large number of specimens in southern Illinois, although the bulk of his collections was angiosperms. Between 1947 and 1951, a study of the vegetation of southern Illinois was undertaken by William M. Bailey and Julius R.

Swayne of Southern Illinois University; their specimens are cited as "BS" in the enumeration. During the last four years, John W. Voigt, of the Department of Botany of Southern Illinois University, and the author have made numerous collections in the southern tip of the state, concentrating particularly on the flora of Jackson County. The former's specimens are abbreviated "V," the latter's "M."

Jackson County, located in the southwestern part of Illinois, is bounded on the west by the Mississippi River, on the northwest by Randolph County, on the north by Perry County, on the east by Franklin and Williamson Counties, and on the south by Union County. It is drained by the Big and Little Muddy Rivers and Beaucoup Creek.

The large number of vascular plants recorded for Jackson County is due primarily to the great variety of habitats found. Limestone bluffs occur in the southwestern part of the county—e.g., Devil's Bake Oven and Devil's Backbone, near Grand Tower, along the Mississippi River, and Grassy Knob and Swallow Rock, along the Big Muddy River. *Cheilanthes feei, Pellaea atropurpurea,* and *Asplenium resiliens* are confined to these habitats.

The Ozark or Shawneetown Ridge, composed primarily of sandstone, lies along an east-west line across southern Illinois; it has its western origin in Jackson and Union Counties. Characteristic pteridophytes found along this ridge are *Cheilanthes lanosa, Polypodium polypodioides* var. *michauxianum, Asplenium pinnatifidum,* and *Isoëtes butleri.* Included in this conspicuous topographic feature is a portion of Giant City State Park (Jackson and Union Counties), where 26 species of ferns and fern-allies have been collected.

A tremendous rock formation known as Fountain Bluff or Big Hill, consisting primarily of silicious limestone, shale, and massive sandstone, is located in the southwest-

ern section of the county; it is very rich in species of vascular plants. Another excellent collecting ground for ferns is Little Grand Canyon, where are found such rare species (in southern Illinois) as *Osmunda regalis*, *Botrychium dissectum*, and *Lycopodium lucidulum*. Other sandstone bluffs in the county include "the Kinkaids" and Horseshoe Bluff.

Included in the diverse habitats of the county are a large floodplain, east of Fountain Bluff, known as the Oakwood Bottoms, several artificial lakes, and remnants of original prairie in the northern part of the county.

Sixty-six pteridophytes are known to occur in Illinois, 44 of them being found in the southern 16 counties; Jackson County has 36 species.

Papers in which there is some mention of southern Illinois ferns include those by French (1870), Seymour (1882), Gleason (1903, 1904, 1906), Palmer (1921), and Steagall (1927). The only extensive treatment of Illinois Pteridophyta is that by Jones (1947). Nomenclature used in this treatment for the most part follows that of Morton, in Gleason (1952). Other well-known species names are given in parentheses. All specimens cited are in the herbarium of Southern Illinois University, with the exception of those marked UI (University of Illinois Herbarium).

LYCOPODIACEAE

LYCOPODIUM LUCIDULUM Michx. This club-moss is known only from one station in Jackson County, a wet north-facing bluff with slightly acid soil, in Little Grand Canyon. The specimens may be segregated as var. *occidentale* (Clute) L. R. Wilson. This is the only *Lycopodium* known from the county. It is found also in Pope County, where one other species, *L. complanatum* L. var. *flabelliforme* Fern. occurs also, on a sandstone ledge along Lusk Creek.

SPECIMEN EXAMINED: Little Grand Canyon, Nov. 22, 1949, *Hatcher*.

SELAGINELLACEAE

Although no species of *Selaginella* has been collected in the county, two are to be looked for: *S. rupestris* (L.) Spring, which prefers dry, exposed sandstone, and *S. apoda* (L.) Spring, which usually grows along stream banks. In southern Illinois, the former has been collected in Pope County and the latter in Pope and Union Counties.

ISOËTACEAE

ISOËTES BUTLERI Engelm. This rare plant was first discovered in Illinois in March, 1953, at Giant City State Park (Jackson County), and first reported as *Isoëtes engelmannii* A. Br. (Voigt, 1953); it has since been collected in Pope County by Voigt (Belle Smith Springs) and by the writer (Dixon Springs State Park), and in Union County by the writer. Unlike other species of *Isoëtes* of northeastern North America, this species grows in moist depressions on ledges of bluffs. The leaves appear in early March, the spores in mid-May, and the plants die down completely by early June. Our plants, which seldom have more than 15 erect, slender leaves, are difficult to detect, since they grow mixed with *Allium cernuum*, *Nothoscordum bivalve*, and various grasses. Pfeiffer (1922) gives the habitat for *I. Butleri* as "limestone ledges" or "limestone barrens," but the stations in southern Illinois are on sandstone. Our specimen has been identified by Dr. Rolla M. Tryon. A previous report of this species from Illinois by Hill (1912) is an error (*fide* Jones, 1947).

SPECIMENS EXAMINED: Giant City State Park, April 30, 1953, *V* 1320; April 30, 1954, *M* 1904.

EQUISETACEAE

EQUISETUM ARVENSE L. The Common Horsetail, our

most abundant *Equisetum*, is found along almost every railroad embankment, where it might often be classed as a weed.

SPECIMENS EXAMINED: Carbon Lake, July 29, 1949, *Hatcher*; Southern Illinois University Campus, May 23, 1940, *McCree* 65.

EQUISETUM HYEMALE L. This plant may be found along most of the streams, preferably in moist sandy soil. It is often found growing with the Winged Monkey-flower (*Mimulus alatus*), False Pimpernels (*Lindernia anagallidea* and *L. dubia*), Blue Lobelia (*Lobelia siphilitica*), and *Leucospora multifida*. It is our only evergreen *Equisetum*, and is further distinguished by its roughened, unbranched stems, and by the teeth of its sheaths being usually persistent.

SPECIMENS EXAMINED: Along Stonefort Creek, Giant City State Park, May 25, 1953, *M* 559; Kinkaid Creek, June 27, 1951, *BS* 1949; Grand Tower, Nov. 5, 1881, *French & Seymour* (UI).

EQUISETUM LAEVIGATUM A. Br. This is an annual species, with smooth unbranched stems, and with the teeth of the sheaths soon falling. The only station in the county is in moist clay on a railroad embankment. It is reported in southern Illinois from Perry County by Jones (1947).

SPECIMEN EXAMINED: Along the Gulf, Mobile, and Ohio Railroad, about 3 miles north of Etherton, May 12, 1954, *M* 1901.

OPHIOGLOSSACEAE

BOTRYCHIUM DISSECTUM Spreng. var. DISSECTUM. This fern, which grows in moist woodlands, has been found only twice in the county.

SPECIMENS EXAMINED: Giant City State Park, March 7, 1953, *Weber* 491; Little Grand Canyon, *Brewer* 1.

BOTRYCHIUM DISSECTUM var. OBLIQUUM (Muhl.) Clute. This variety, much commoner than var. *dissectum* and usually rather abundant where it occurs, grows in mesic woodlands, along with species of *Viola*, the Green Violet

(*Hybanthus concolor*), and Jack-in-the-Pulpit (*Arisaema atrorubens*). It is commonly called Bronze Fern, because the blades turn bronze in winter.

SPECIMENS EXAMINED: Giant City State Park, March 3, 1951, *Hatcher & Stewart* 231: 4; Little Grand Canyon, Nov. 5, 1949, *Hatcher & Stewart* 231: 2; northeast of Howardton, Sept. 13, 1941, *McCree* 1194; Lake Murphysboro area, Feb. 26, 1954, *M* 4791; Saltpeter Cave, March 8, 1954, *M* 4794. An immature specimen collected in a dry woodland at Giant City State Park by Hatcher (no. 1156) and determined by Dr. Rolla M. Tryon doubtfully as *B. multifidum* (Gmel.) Rupr. should probably be considered as *B. dissectum* var. *obliquum*.

BOTRYCHIUM VIRGINIANUM (L.) Swartz. This fern, popularly known as Rattlesnake Fern, is the commonest *Botrychium* in southern Illinois. It is abundant in mesic woodlands, but may be found in dry woods as well. It is particularly plentiful along Piney Creek, in Randolph County.

SPECIMENS EXAMINED: Giant City State Park, May 30, 1922, *Steagall* 16; south of Murphysboro, May 5, 1941, *McCree* 716; Pomona Natural Bridge, May 14, 1947, *BS* 29.

OPHIOGLOSSUM VULGATUM L. var. PYCNOSTICHUM Fern. This curious fern, the Adder's-tongue, grows in very mesic woods at two stations in the county. Its apparent rarity throughout southern Illinois as well as in Jackson County may be due to its inconspicuousness. The plants usually die down by July. Records from Union County (collected by Bailey and Swayne) and from Alexander County (collected by Brewer) are known. *Ophioglossum engelmannii* Prantl has been collected in Hardin County by Palmer and Winterringer (Jones, 1950); its most probable habitat in Jackson County would be in the Grassy Knob area, for it prefers calcareous soils.

SPECIMENS EXAMINED: 0.5 mile south of Murphysboro, July 26, 1949, *Stewart* 781; Giant City State Park, April 30, 1953, *Stewart*.

OSMUNDACEAE

OSMUNDA REGALIS L. var. SPECTABILIS (Willd.) A. Gray. The Royal Fern, one of our most beautiful ferns, is known in the county only from shaded moist ledges at Little Grand Canyon. Elsewhere in southern Illinois, it has been recorded from Union, Alexander, and Pope Counties. The Cinnamon Fern, *O. cinnamomea* L., has been collected in Pope County also.

SPECIMEN EXAMINED: Little Grand Canyon, May 18, 1954, *M* 1902.

HYMENOPHYLLACEAE

The rare Filmy Fern, *Trichomanes boschianum* Sturm, has not been found in Jackson County, but has been collected in Jackson Hollow, Pope County, where it was first located by Miss Steagall (no. 37, August 2, 1923) at the base of a wet, dripping sandstone bluff.

POLYPODIACEAE

ADIANTUM PEDATUM L. The Maidenhair, one of the well-known ferns of southern Illinois, grows in rich woodlands, commonly associated with *Athyrium pycnocarpon*, *Polemonium reptans*, species of *Viola* and *Hydrophyllum*, and *Asarum canadense* var. *reflexum*. The Venus'-hair Fern, *Adiantum capillus-veneris* L., grows on limestone bluffs in southeastern Missouri, but is not known in Illinois. Its particular habitat does not seem to be present in Jackson County, but is approached in Randolph County. It may be distinguished easily by its unforked stipe.

SPECIMENS EXAMINED: Fountain Bluff, Sept. 16, 1921, *Steagall* 265; Carbon Lake, May 30, 1949, *Hatcher* 787; Lake Murphysboro, April 23, 1954, *M* 2419.

ASPLENIUM BRADLEYI D. C. Eaton. This fern, one of the rarest of northeastern North America, was first discovered in Illinois in Randolph County in the spring of

1954 (Mohlenbrock, 1954), which was the first new record for a species of true fern in Illinois since the discovery of *Trichomanes boschianum* in 1923. It is most abundant along Piney Creek, just west of West Point. It has now been found along the Jackson County extension of the creek.

SPECIMEN EXAMINED: Along Piney Creek, near West Point, March 6, 1955, *M* 4988.

ASPLENIUM PINNATIFIDUM Nutt. The Pinnatifid Spleenwort is not common in Illinois, but does grow abundantly in Giant City and other isolated areas, generally along the Shawneetown Ridge. Its habitat is crevices of sandstone bluffs. The blades are variable, but usually merely pinnatifid. A new form in which the pinnae are rudimentary and the sori are borne along the rachis has been found among typical plants at Giant City, in the Union County part of the park. Plants of this form are being grown in the experimental greenhouse of the Missouri Botanical Garden. This species also grows in Pope, Johnson, Union, Randolph, and Gallatin Counties. It is readily distinguished from other local spleenworts by its green rachis.

McCree 1194; Lake Murphysboro area, Feb. 26, 1954, *M* 4791; *BS* 714; six miles west of Murphysboro, "The Kinkaids," March 13, 1954, *F & M* 1806; Saltpeter Cave, May 13, 1954, *M* 2492.

ASPLENIUM PLATYNEURON (L.) Oakes. The Ebony Spleenwort is a common fern of open woods.

SPECIMENS EXAMINED: Fountain Bluff, Sept. 21, 1921, *Steagall* 209; four miles west of Carbondale, June 24, 1940, *McCree* 239; Giant City State Park, Sept. 13, 1940, *McCree* 508; Carbon Lake, Oct. 17, 1949, *Hatcher* 231: 19; Lake Murphysboro, Feb. 27, 1954, *M* 1804; Peter's Cave, April 5, 1954, *M* 1894.

(*To be concluded*)

The Ferns Described by Sessé and Mociño

WILLIAM R. MAXON AND C. V. MORTON

Some years ago, Mr. Paul C. Standley requested us to prepare an account of the ferns described in the Flora Mexicana and Plantae Novae Hispaniae of Sessé and Mociño, to be included in an extended paper that he was preparing. It now seems likely that Mr. Standley's work will not be finished, so it seems best to publish the fern portion separately now.

The history of the Flora Mexicana and Plantae Novae Hispaniae has been given in detail elsewhere.[1] These works might have been of significance if published at the time they were written, but they were out of date and useless when actually printed, nearly a hundred years later. Nevertheless, they do contain a number of validly published names that have to be taken into account for purposes of priority.

Many specimens of the Sessé and Mociño Mexican collections were sent on loan from Madrid to the Chicago Natural History Museum. We have examined all the ferns, a relatively large number; most of the species represented were not included in the published work. Curiously enough, the species that actually were published are mostly not represented by specimens. The actual types were probably removed at some time, and are probably now in the general herbarium at Madrid. For this reason we have been obliged to identify some of the published records from the descriptions only.

ADIANTHUM CORDIFOLIUM Sessé & Moc. Pl. Nov. Hisp. 182. 1887–90; ed. 2, 169. 1893. Not listed in Christensen, Index Filicum. There is no specimen in the Sessé

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[1] *Cf.* T. A. Sprague, "Sessé and Mociño's Plantae Novae Hispaniae and Flora Mexicana," Kew Bull. 1926: 417–425; this paper gives a bibliography of publications on Sessé and Mociño up to 1926.

and Mociño Herbarium. The original collections were from rocks at Cuyuacán and walls at San Agustín, near Mexico City. From the locality and from the brief description it seems likely that this is the plant known now as *Pellaea cardiomorpha* Weatherby, i. e. *P. cordata* (Cav.) J. Smith (1856), not Fée (1852), in which case the epithet *cordifolium* has priority.

ADIANTHUM DIGITATUM Sessé & Moc. Pl. Nov. Hisp. 182. 1887–90; ed. 2, 169. 1893, not Presl ex Hooker (1851). Not listed in Christensen, Index Filicum. Described from a specimen from the banks of a stream at San Augustín, near Mexico City. Sessé & Moc. Herb. no. 3849 may be considered the type; it is labelled *Adianthum digitatum*. Specimen 3921 is the same but is not named. Both specimens are *Pteris cretica* L.

ADIANTHUM ETHIOPICUM? Fl. Mex. 261. 1887; ed, 2, 238. 1894. The species name and the query indicate that this is not considered a new species, *A. aethiopicum* L. (1759) being surely intended. The Sessé and Mociño material was from Guantánamo River, Cuba, where *A. aethiopicum* is not known or to be expected. There are no specimens in the Sessé and Mociño Herbarium. Probably the plants described were *A. tenerum*, which is common in eastern Cuba in the region of Guantánamo.

ADIANTHUM RENIFORME L. Pl. Nov. Hisp. 181. 187–90; ed. 2, 168. 1893; Fl. Mex. 261. 1887; ed. 2, 238. 1894. This species of Madeira and the Canary Islands is reported from Xorullo [Volcán Jorullo, State of Michoacán], but nothing resembling it is known from Mexico.

ADIANTHUM TERNATUM Sessé & Moc. Pl. Nov. Hisp. 182. 1887–90; ed. 2, 169. 1893, not Humb. & Bonpl. ex Willd. (1810). Not listed in Christensen, Index Filicum. Described from Santa Rosa, near Guanajuato, Mexico. The specimen in the Sessé & Mociño Herbarium No. 3927 may be regarded as the type; it is labelled merely "*Adi-*

anthum." It is *Pellaea ternifolia* (Cav.) Link.

ADIANTHUM TRAPESIFORME Sessé & Moc. Fl. Mex. 261. 1887; ed. 2, 238. 1894. Described from specimens from Guantánamo River, Oriente, Cuba. This was doubtless not intended as a new species but as *A. trapeziforme* L., although there is no reference to Linnaeus or to any other author. The description seems to apply to *A. trapeziforme* L. There is no specimen in the Sessé and Mociño Herbarium.

ADIANTHUM TRIFOLIATUM Sessé & Moc. Fl. Mex. 261. 1887; ed. 2, 238. 1894., not L. (1753). There are two species described, one after the other on the same page, as *A. trifoliatum.* The descriptions are different. The first was evidently an error for *A. ternatum,* for the description is almost identical word for word with the description of *A. ternatum* in Plantae Novae Hispaniae; the species is a synonym of *Pellaea ternifolia* (Cav.) Link. The second *A. trifoliatum,* although described in somewhat different terms, seems also to represent *Pellaea ternifolia* (Cav.) Link. No. 3927 of the Sessé and Mociño Herbarium, which is merely labelled *Adianthum,* is doubtless the type of the first one of these species *A. trifoliatum.*

POLYPODIUM FILIX-MAS L. *sensu* Sessé & Moc. Pl. Nov. Hisp. 181. 1887–90; ed. 2, 168. 1893. Sessé and Mociño refer a specimen from Tepelpa, near Mexico City, to this species. They give no comments and quote only the Linnaeus diagnosis and citation, and so it is impossible to be sure of the identity of the plant concerned. *Polypodium alatum* L. is the West Indian species now known as *Dryopteris alata* (L.) Maxon. Specimen 3856 of the Sessé and Mociño Herbarium is labelled *P. alatum;* it is a true *Polypodium—P. madrense* J. Smith.

POLYPODIUM AUREUM L. *sensu* Sessé & Moc. Pl. Nov. Hisp. 181. 1887–90; ed. 2, 168. 1893. No. 3855 of the Sessé and Mociño Herbarium is labelled *P. aureum;* it

is correctly named. No. 3860 labelled *P. aureum?* is also correctly a form of *aureum.*

POLYPODIUM CRASSIFOLIUM Sessé & Moc. Fl. Mex. 261. 1887; ed. 2, 239. 1894. Presumably intended as *P. crassifolium* L., although no reference is cited; the diagnosis is identical with that of Linnaeus except for the addition of the word [frondibus] "subrepandis." There is no specimen in the Sessé and Mociño Herbarium.

POLYPODIUM FILIX-MAS L. *sensu* Sessé & Moc. Pl. Nov. Hisp. 181. 1887–90; ed. 2, 168. 1893. The diagnosis is quoted from Linnaeus. In the absence of a specimen in the Sessé and Mociño Herbarium, no decision on the identity of the Mexican plants concerned can be reached; the probability is that they were *Dryopteris paleacea* (Swartz) C. Chr., a tropical American ally of *D. Filix-mas* (L.) Schott.

POLYPODIUM FURFURATUM Sessé & Moc. Fl. Mex. 262. 1887; ed. 2, 239. 1894. The original specimens (not now in the Sessé and Mociño Herbarium) came from Cuba. Judging from the fairly adequate description, the species is a synonym of *P. polypodioides* (L.) Watt.

POLYPODIUM LEPTOPHYLLUM L. *sensu* Sessé & Moc. Pl. Nov. Hisp. 181. 1887–90; ed. 2, 168. 1893. Probably a correct report, for *P. leptophyllum,* i. e. now *Anogramma leptophylla* (L.) Link, is known from Mexico; however, there are no substantiating specimens in the Sessé and Mociño Herbarium.

POLYPODIUM PALMATUM Sessé & Moc. Fl. Mex. 261. 1887; ed. 2, 239. 1894, not Blume, 1828. This species listed as dubious in the Index Filicum, will have to remain doubtful. There is no specimen. It was described from Cuban material and was said to be allied to *P. virginianum;* however, the description of the fronds as palmately-pinnatifid with five lobes does not indicate an alliance with *P. virginianum* or with any other known Cuban species.

POLYPODIUM PUBESCENS Sessé & Moc. Pl. Nov. Hisp. 181. 1887–90; ed. 2, 168. 1893, non L. (1759). Although Linnaeus is not mentioned, the diagnosis and the locality [Jamaica] indicate that probably *P. pubescens* L. was intended. However, the additional locality "Nova Hispania" was based on a misidentification, for *P. pubescens* L., i. e. *Dryopteris pubescens* (L.) Kuntze, is not known from Mexico, and the specimen in the Sessé and Mociño collection labelled *Polypodium pubescens* (no. 3854) is a quite different plant, a form of *Athyrium Filix-femina*, agreeing best with some of the Mexican forms that have been referred to *Athyrium Dombei* Desvaux.

POLYPODIUM RETICULATUM Sessé and Moc. Fl. Mex. 261. 1887; ed. 2, 239. 1894, non L. (1759). Although Linnaeus is not mentioned, this species was probably intended as *P. reticulatum* L. The diagnosis, based on Cuban material, agrees well enough with *Dryopteris reticulata* (L.) Urban. There is a specimen in the Sessé and Mociño Herbarium (no. 3842) labelled "*Polypodium reticulatum*?," which represents an utterly different plant, a form of *P. phyllitidis* L.; this specimen evidently had no part in the original diagnosis.

PTERIS ACINACIFORMIS Sessé & Moc. Fl. Mex. 262. 1887; ed. 2, 239. 1894. Listed as dubious by Christensen in Index Filicum. There is no specimen. Of Cuban ferns, no species can be intended except *Adiantum pulverulentum* L.

LYCOPODIUM NIDIFORME Sessé & Moc. Fl. Mex. 262. 1887; ed. 2, 239, 1894. This species, which is quite well described, has a type specimen, no. 3906 of the Sessé & Mociño Herbarium; a probable paratype (no. 3894) is labelled merely *Lycopodium sp. nov.* These specimens represent the common species formerly known as *Selaginella cuspidata* Link, which is now replaced by the older name *Selaginella pallescens* (Presl) Spring.

LYCOPODIUM REPENS Sessé & Moc. Fl. Mex. 262. 1887; ed. 2, 239. 1894, non Swartz (1806). The description indicates a species of *Selaginella*, subgenus *Euselaginella*, but the distinctive specific characters are not given. The name is omitted in Dr. Tryon's recent account of the allies of *S. rupestris*.

The following species, also reported from Mexico by Sessé and Mociño, are not represented by specimens. None of them are known from Mexico at the present time: *Polypodium piloselloides* L., *Polypodium taxifolium* L., *Equisetum arvense* L., and *Equisetum limosum* L.

The Ophioglossaceae of Iowa

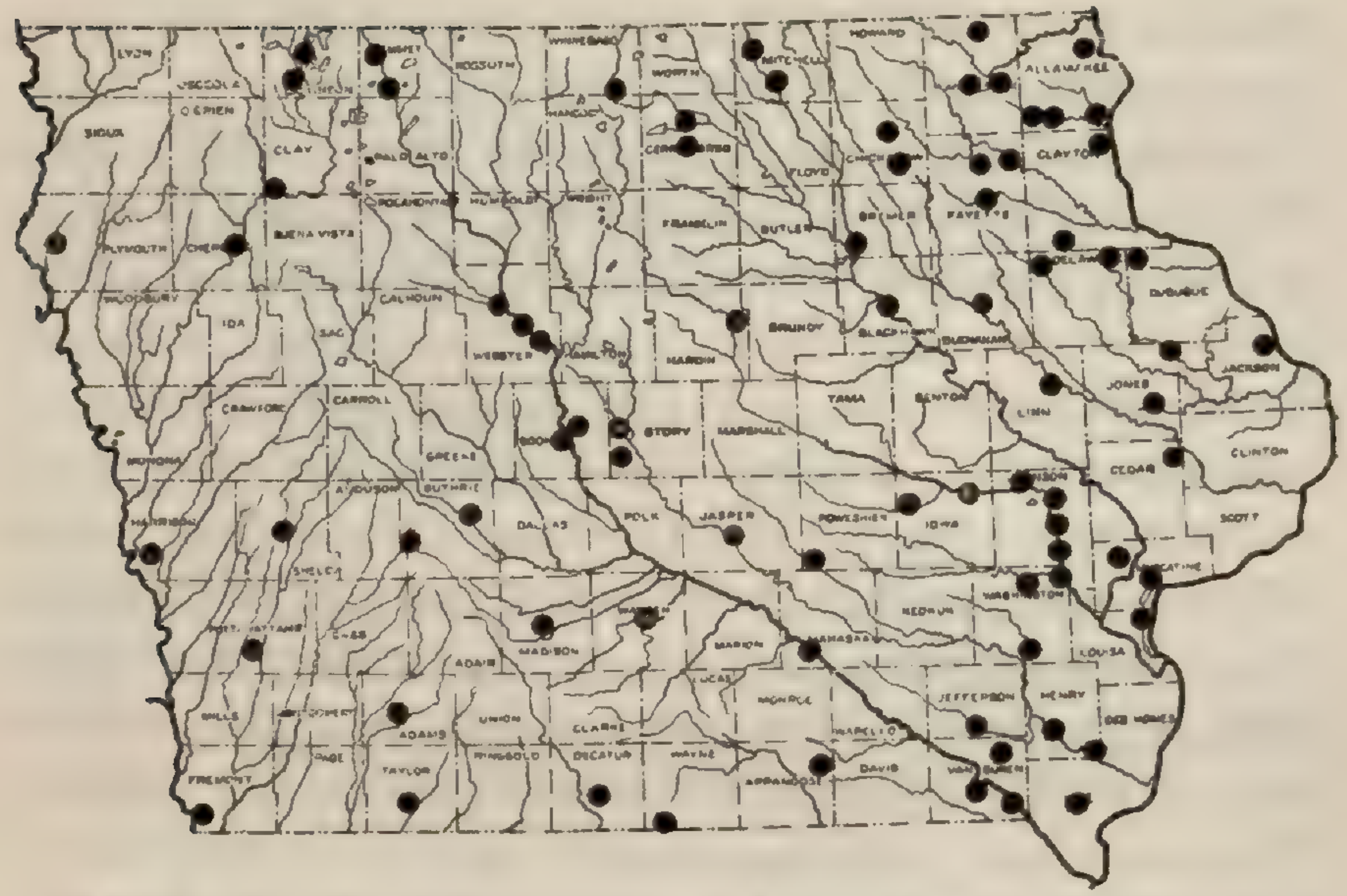
TOM S. COOPERRIDER

Until 1954 only three species of Ophioglossaceae were known from Iowa, as reported by Graves (1931), Lyness (1933), and Clausen (1938). The commonest of these is *Botrychium virginianum* (L.) Swartz, which occurs throughout the state (Map 1). *Botrychium multifidum* (Gmel.) Rupr. var. *intermedium* (D. C. Eaton) Farwell has been found only rarely. The above-mentioned authors cite a collection from Fayette County. More recently, it has been found near Ridgeway, in Winneshiek County, by W. L. Tolstead, who reports it also from near Freeport, in the same county (Tolstead, 1938). It has been seen in Delaware County by Wood (1882) and in Floyd County by Arthur (1884). *Botrychium dissectum* Spreng. var. *dissectum* has been collected at one station, and var. *obliquum* (Muhl.) Clute is known from six stations, of which those in Johnson and Washington Counties have been discovered since the reports by Graves, Lyness, and Clausen. The station in Linn County was one known to the late Prof. B. Shimek and reported by Graves; that in Winneshiek County was reported by Melhus (1936). The distribution of all these species

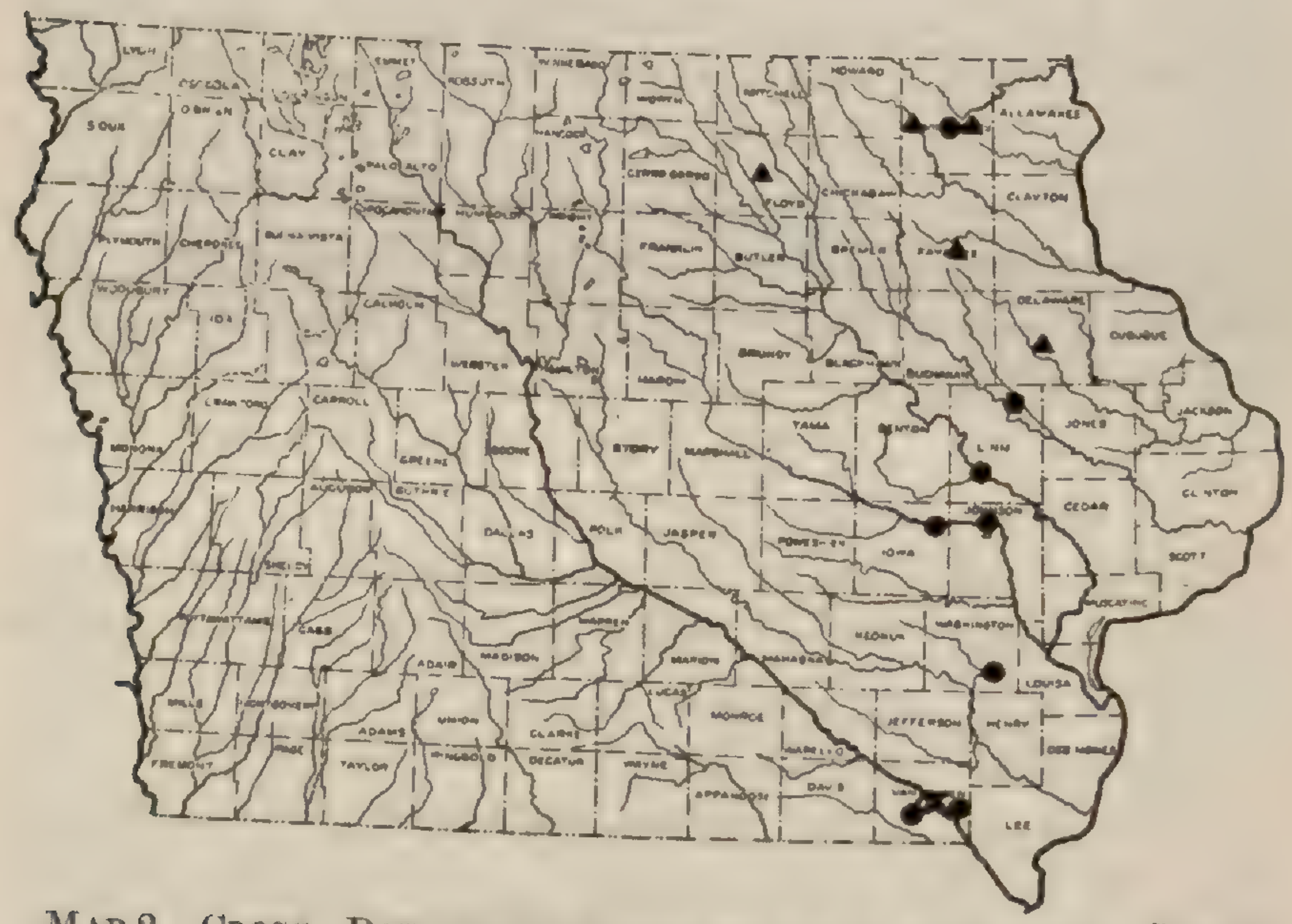
(Map 2) is treated in the writer's unpublished thesis on Iowa pteridophytes (Cooperrider, 1955).

Two more species may now be reported. *Botrychium simplex* E. Hitchc. var. *simplex* was found May 15, 1954, by a group from the State University of Iowa on a field-trip to northeastern Iowa. Several specimens (*Thorne, Hulbary, Cooperrider et al.* 14013) were collected, but all were immature. A later visit was made on June 10 to collect mature specimens (*Thorne, Cooperrider et al.* 14112). The locality is in Linn County, T.86N, R.6W (Jackson Twp.), Section 27, a few hundred feet from State Highway 13, at the eastern perimeter of a shallow pond or boggy marsh in a heavily-grazed sandy pasture. This marsh has been described by Drexler (1952) as "a glacial pond surrounded by the windblown Lindley fine sand." He mentions mats of *Sphagnum* being present on the southern and eastern margins on "wet sand or a mixture of wet sand and muck soil," and lists three species: *S. magellanicum* Brid., *S. palustre* L., and *S. subsecundum* Nees. Other noteworthy plants in the shallow water and boggy margin of this pond are: *Thelypteris palustris* Schott, *Sparganium americanum* Nutt., *Potamogeton vaseyi* Robbins, *Sagittaria rigida* Pursh, *Dulichium arundinaceum* (L.) Britt., *Eriophorum angustifolium* Honckeny, *Carex interior* Bailey, *Brasenia schreberi* Gmel., and *Hypericum boreale* (Britt.) Bickn. In the sandy pasture and sand hills nearby are such plants of sterile soils as: *Festuca octoflora* Walt., *Draba reptans* (Lam.) Fern., *Viola sagittata* Ait., *Oenothera laciniata* Hill, *Gaylussacia baccata* (Wang.) K. Koch, and *Houstonia minima* Beck.

At the same locality, while searching for *B. simplex* on June 10, we found one sterile and one fertile plant of *Ophioglossum vulgatum* L., both immature. This collection (*Thorne, Cooperrider et al.* 14113) is the first record of the genus *Ophioglossum* in Iowa.



MAP 1. RANGE OF BOTRYCHIUM VIRGINIANUM IN IOWA. EACH CIRCLE REPRESENTS A SPECIMEN IN THE HERBARIA OF THE STATE UNIVERSITY OF IOWA OR IOWA STATE COLLEGE, OR A COUNTY REPORT FROM THE LITERATURE



MAP 2. CROSS: BOTRYCHIUM DISSECTUM VAR. DISSECTUM; CIRCLE: B. DISSECTUM VAR. OBLIQUUM; TRIANGLE: B. MULTIFIDUM VAR. INTERMEDIUM: SQUARE: B. SIMPLEX AND OPHIOGLOSSUM VULGATUM

REFERENCES

Arthur, J. C. 1884. Contributions to the flora of Iowa, VI. Proc. Davenp. Acad. Nat. Sci. **4**: 64–75.

Clausen, R. T. 1938. A monograph of the Ophioglossaceae. Mem. Torrey Bot. Club **19**: 3–177.

Cooperrider, T. S. 1955. The pteridophytes of Iowa. Unpublished M.S. thesis. State University of Iowa.

Drexler, R. V. 1952. The genus Sphagnum in Iowa. Proc. Iowa Acad. Sci. **59**: 85–88.

Graves, E. W. 1931. Botrychiums of the Central States. Amer. Fern Journ. **21**: 125–132.

Lyness, A. S. 1933. Notes on the fern flora of Iowa. Amer. Fern Journ. **23**: 39–49.

Melhus, I. E. 1936. Native ferns of Iowa. Iowa State Coll. Ext. Circ. 225.

Tolstead, W. L. 1938. A flora of Winneshiek and Allamakee Counties and Clayton County in the vicinity of McGregor. Iowa State Coll. Journ. Sci. **12**: 321–384.

Wood, Mary E. 1882. Ferns of Iowa. Bot. Gaz. **7**: 73.

STATE UNIVERSITY OF IOWA, IOWA CITY, IOWA.

Shorter Notes

KOSAR IDENTIFIED AS BRACKEN.—Professor Herbert M. Clarke, of the University of Wisconsin, provides the following answer to the question raised in a recent number of the Journal as to the identity of "kosar," a plant-food which some U. S. soldiers learned to eat, if not to like, as prisoners in North Korea.

"In reply to your query regarding 'kosar,' I wish to give you the following information: Mr. Woon-Soo Kim, a graduate student from Korea in plant physiology and botany at the University of Wisconsin, tells me that kosar refers to *Pteridium aquilinum*, which he likes to eat when prepared properly and flavored or seasoned. The following seasoning materials are used with the boiled bracken fiddleheads: sugar, pepper, salt, garlic, catsup, and sesame."—R. C. BENEDICT.

A NEW COMBINATION IN CTENITIS.—The New Zealand fern which has been passing as *Dryopteris decomposita* (R. Brown) Kuntze, or *Ctenitis decomposita* (R. Brown) Copeland,[1] is specifically distinct from typical *C. decomposita* of Australia, which is a large plant with the ultimate leaf-segments acute at the apex. The New Zealand plant is much smaller, and has the lobes obtuse at the apex; there are usually more teeth on the sides of the lobes. The following new combination is needed:

Ctenitis pentangularis (Colenso) Alston, comb. nov.

Nephrodium pentangulare Colenso, Tasman. Journ. **2**: 169. 1844.

Aspidium quinquangulare Kunze, Linnaea **23**: 230, 302. 1850.

Dryopteris decomposita sensu auctt. N. Z.

This species is in cultivation in the United States. A specimen was collected at Morgan's Nursery, Pasadena, California, September 5, 1953, by Barbara Joe (no. 408.) —A. H. G. ALSTON, *British Museum (Natural History), London, England.*

GROWING FERN PROTHALLIA IN LIQUID CULTURE.—Under this title, a leading biological supply house describes how they grow prothallia and young sporophytes wholesale: 200,000 in 3 years. Finger-bowls are set in a west window where the sun shines on them for 5 hours or so. A shallow layer of culture solution is poured into a bowl, and the spores dusted over it with a camel's-hair brush. To avoid spores being sloshed up the sides, the bowl is not moved after sowing. Then a second bowl is stacked on the first and the process repeated until about seven are piled up, an eighth, empty, being added as a cover. The medium used requires no sterilization, and the only trouble due to contamination has been from mosses, the

[1] *E. g.*, in Dobbie, New Zealand Ferns, Fourth Edition. 1952.

spores of which had been blown on to the fern fronds. Spores are collected by laying mature fronds—*Woodwardia virginica* is recommended—on shiny paper for 12 to 24 hours.—E. T. WHERRY.

Recent Fern Literature

A cytotaxonomic paper of maximum importance to students of the basic relationships and taxonomy of Filicineae has recently appeared.[1] Prof. Irene Manton and her co-workers have in this work continued the same line of investigation that characterized her book "Problems of Cytology and Evolution in the Pteridophyta."[2] The numerous new cytological reports contained here are extremely timely in view of the present unsettled state of fern classification, which has been investigated during the last two decades by several authors including Ching, Christensen, Dickason, Holttum, and Copeland. To a close student of the problems involved in filicinean classification, the newly discovered cytological data presented by Prof. Manton will confirm some concepts founded on recent correlations of morphological data, and also indicate some unexpected deviations from current concepts. The published work is divided into several sections, of which the most stimulating is certainly the "Discussion of the Taxonomic System in the Light of Cytology."

The investigation is based on the results of the Leeds University Expedition to Ceylon during 1950–51. Approximately 140 taxa in the fern flora of Ceylon provide the core of this report, to which have been added records of 61 taxa from other countries, which makes this a significantly comprehensive report. All the data

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[1] Manton, I. W. and W. A. Sledge. Observations on the Cytology and Taxonomy of the Pteridophyte Flora of Ceylon. Phil. Trans. Royal Soc. of London, Ser. B., Biol. Sci. **238** (no. 654): 127–185. *figs. 1–20, pl. 5–14.* 1954.

[2] Reviewed, this JOURNAL, **41**: 88–93. 1951.

are discussed in the text, and they are also organized into a useful table. The cytological findings are discussed in relation to the taxonomic system of Copeland and that of Holttum.

Manton previously reported that the highest number of chromosomes recorded in living things was possessed by the common adder's-tongue of temperate climates, *Ophioglossum vulgatum*, with a diploid number estimated to be from 500 to 520. Now this honor passes to *O. petiolatum*, which is probably the commonest and most widespread species of adder's-tongue encountered in the tropics, whose diploid chromosome number is apparently somewhere between 1000 and 1020. Of the species of *Botrychium* studied, both *B. lanuginosum* and *B. daucifolium* proved to be tetraploids ($n = 90$) in relation to the diploid European *B. Lunaria* ($n = 45$). The complexity of tropical pteridology is now increased by the authors' finding that no less than 13 of the species examined possessed multiple chromosome types within them. These species included such familiar tropical plants as *Lygodium circinnatum* ($n = 29, 58$), *Dicranopteris linearis* ($n = 30, 58$) and *Cheilanthes farinosa* ($n = 30, 58$). Several species of ferns which were formerly considered questionable were confirmed as distinct taxa on the basis of morphological and cytological evidence. Sixteen of the species investigated proved to be apogamous, including *Cheilanthes farinosa, Actiniopteris australis, Adiantum caudatum, A. philippense*, and *Humata repens*. Numerous inter-specific hybrids were examined, as well as two cases of putative inter-generic hybridization (*Quercifilix* × *Tectaria*, and *Bolbitis* × *Egenolfia*).

In general, the findings confirm the classification of Copeland's *Genera Filicum*. Two major changes, however, are recommended by the cytological evidence: (1) The removal of the *Thelypteris* (*Lastrea*) group from

the Aspidiaceae into a separate family; and (2) the separation of *Pteris*, *Coniogramme*, *Acrostichum*, and the gymnogrammoid ferns—all with $n = 29$, 30—from the Pteridaceae, the latter with other numbers. One of the most unexpected differences in chromosome numbers in the latter series is that found between *Pteridium* ($n = 52$) and *Pteris* ($n = 29$).

The writers briefly discuss Holttum's belief that *Asplenium* was derived from a davallioid ancestor and that the sorus of *Asplenium* evolved from one like that in *Davallia* through a soral stage similar to that found in the aspleniaceous genus *Loxoscaphe*. They conclude on cytological grounds that this is unlikely, because the base number of $n = 36$ which characterizes the Aspleniaceae, including *Loxoscaphe*, is different from that in the Davalliaceae.[3] The numbers of $n = 40$, 41, which have been determined in *Davallia*, *Humata*, *Nephrolepis*, *Arthropteris*, and others of the Davalliaceae seem to the reviewer to be suggestive of those of the truly aspidioid ferns, a group made up, for the most part, of terrestrial plants. I wonder whether it is not possible that the davallioid ferns are in reality epiphytic derivatives of the Aspidiaceae; certainly, the morphological resemblances between such forms as *Rumohra adiantiformis* and typical Davalliaceae seem quite obvious, and the chromosome numbers appear to be the same. It is of interest, in this connection, to learn that Copeland's placement of the epiphytic genus *Elaphoglossum* in the Aspidiaceae is now supported by the cytological evidence reported in this new paper.

In supporting on cytological grounds much of Copeland's system of classification, the writers have also been able to verify one of the most interesting and diffi-

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[3] The reviewer has discussed this problem in detail previously from the standpoint of numerous morphological and anatomical data and came to the same conclusion. (Univ. Calif. Publ. Bot. **26**: 124–126, 140, 141, etc.).

cult concepts involved in fern taxonomy—the attainment of closely similar structures by entirely different phylogenetic lines. In the words of Manton and Sledge, "This brings us to what is perhaps the most important general conclusion which our present survey has yielded. This is the strong confirmation of the reality of parallel and even convergent evolution in ferns. Time after time during the last hundred years the evidence has had to be accepted that the characters which at first seemed trustworthy as a basis for classification have in fact been developed more than once in the evolutionary history of the group." They cite several examples of parallel soral evolution, and point out that what is true of sori is certainly true of other characters, and that it may also prove true of chromosome numbers. Nevertheless, the cytological evidence appears, in this reviewer's eye, to correlate extremely well with other data.—WARREN H. WAGNER, JR.

"Multiple Uses of Some Generic Names of Ferns and Fern-allies, Living and Fossil," by Clyde F. Reed,[1] treats 175 generic names that have been used more than once, either with the same or with slightly different spellings. Such names, termed homonyms, are troublesome, because the one of later date is illegitimate and must be abandoned, or placed on the list of *Nomina Conservanda*. The list of conserved names is already too large, because of the conservation of the names of genera that are small and insignificant,[2] and therefore only truly important names ought to be added. It is therefore fortunate that Dr. Reed's list does not show the necessity of adding any to the conserved list of living ferns. Only two genera that are sometimes currently accepted prove to need renaming (both are too small to deserve consideration for

[1] Taxon 4: 105–117. 1955.

[2] A notable example is *Bessera*, an unimportant genus of Liliaceae with probably only a single species.

conservation), namely *Schaffneria* and *Trichopteris*. The taxonomic validity of both genera is questionable and needs verification. Dr. Reed's list includes quite a number of names that were published only as sectional names, which is misleading, for it seems to imply that these names are in competition with generic names, which is not true.—C. V. M.

"Welsh Ferns, A Descriptive Handbook," by H. A. Hyde and A. E. Wade,[1] is the most complete, the most usable, and the most recent book on the ferns of Great Britain. (Although devoted mostly to the ferns of Wales, the book treats also the other species occurring in Great Britain, more summarily.) The excellent Introduction of 32 pages is really a short textbook on ferns, discussing such matters as life-history, descriptive terms, and classification. The typography, illustrations, up-to-date nomenclature, and the general scientific accuracy are all to be highly commended.—C. V. M.

"Ferns of Rotuma Island, a Descriptive Manual," by Harold St. John,[2] describes and discusses the 31 species known from Rotuma Island, a small island, only 9 miles long, located in the central Pacific Ocean about 300 miles northwest of Fiji. Dr. St. John's is the only collection of plants ever made on Rotuma. As might be expected, the ferns are mostly widely ranging species of the South Pacific. Two new species were found, *Tectaria dimorpha* St. John and *Cyclosorus rotumaensis* St. John; the latter is known only from Rotuma, but may yet be found in Fiji, or in some of the little known neighboring island groups, such as the Gilbert Islands, Ellice Islands, Wallis Islands, or the New Hebrides.—C. V. M.

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[1] Edition 3. pp. 1–131. 1954. Published by the National Museum of Wales, Cardiff, Wales, Great Britain.

[2] Occasional Papers, Ber. P. Bishop Mus., Honolulu, 21: 161–208. 1954.

"A Contribution to the Fern Flora of French Guiana," by K. U. Kramer,[1] lists collections and makes a number of taxonomic comments. The key presented to the Guiana species of *Adiantum* will be helpful; *A. cristatum* L. and *A. melanoleucum* Willd. are reported for the first time from French Guiana, but the records are just a little dubious, for definite localities are not known. —C. V. M.

American Fern Society

INFORMATION DESIRED.—Copies of the first two membership lists of the Linnaean Fern Chapter, those for 1893 and 1894, are desired to complete the archives of the American Fern Society. Dr. R. M. Tryon Jr., Librarian of the Fern Society, reports that the Library lacks the first three such lists, but Mr. Morton has recently forwarded a copy of the 1895 list, so that only the first two are now lacking. Anyone who has copies of these to spare or knows where such copies are obtainable will render the Society a real service by sending information to the Librarian. These membership lists, together with the annual officers' reports are the "vital statistics" of the Society. For the first three years of the Linnaean Fern Chapter, the officers' reports were printed in the tiny Linnaean Fern Bulletin, and annual membership lists were separately issued in pamphlet form. The list for 1893, a copy of which is available in the Brooklyn Botanic Garden Library, is a folder[2] about 5 by 8 inches, which contains in addition to the list of organizing members, the newly adopted Chapter Constitution and a list

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[1] Act. Bot. Neerlandica 3: 481–494. 1954.

[2] Apparently a reprint; since the above was written, I have seen an original, postcard-sized list kindly lent by our one remaining Charter Member, Miss Elmira Noyes.

of the four elected officers. The list for 1895 is a folder $3\frac{1}{2}$ by $5\frac{1}{2}$ inches, the size of the earliest Linnaean Fern Bulletin.

Beginning with the fourth volume, the ownership of the Bulletin passed "by purchase" from the Fern Chapter to the private possession of W. N. Clute.[1] Thereafter, both annual lists and officers' reports were printed as a separate pamphlet under Chapter auspices. The membership lists were of special importance during the early days of the Fern Society. Many members were actively collecting and exchanging herbarium specimens, and each new list, with its possible addition of a new member from a previously unrepresented part of the country, held possibilities of adding new fern species. At the same time, the very fact of the yearly revision of the lists probably militated against their preservation.

With the thought that some of the complete sets of the twenty volumes of the Fern Bulletin may be accompanied by the associated membership lists, there is given below the location of such complete files of the Fern Bulletin as are reported for American Institutions in the Union List of Serials. Information as to the location of any additional complete sets would be appreciated, and also, particularly, a record of the members listed for 1894: University of Toronto, University of Illinois, University of Minnesota, Michigan State College, and Iowa State College, Boston Society of Natural History, Massachusetts Horticultural Society, Gray Herbarium, Lloyd Library of Cincinnati, Brooklyn Botanic Garden, Missouri Botanic Garden, N. Y. Botanical Garden, U. S. Department of Agriculture, U. S. National Museum, and Library of Congress.—R. C. BENEDICT.

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[1] See also W. N. Clute, Early Days of the American Fern Society. Amer. Fern Journ. 33: 1–8. 1943.

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Errata

Page 20, line 21: For "var. *Simonsii,*" read "forma *Simonii.*"
Page 20, line 26: For "*laniceolatum,*" read "*lanceolatum.*"
Page 26: line 5: For "*A. inexpectatus,*" read "*Asplenosorus inexpectatus.*"
Page 82, line 4: For "Christmas," read "wood."

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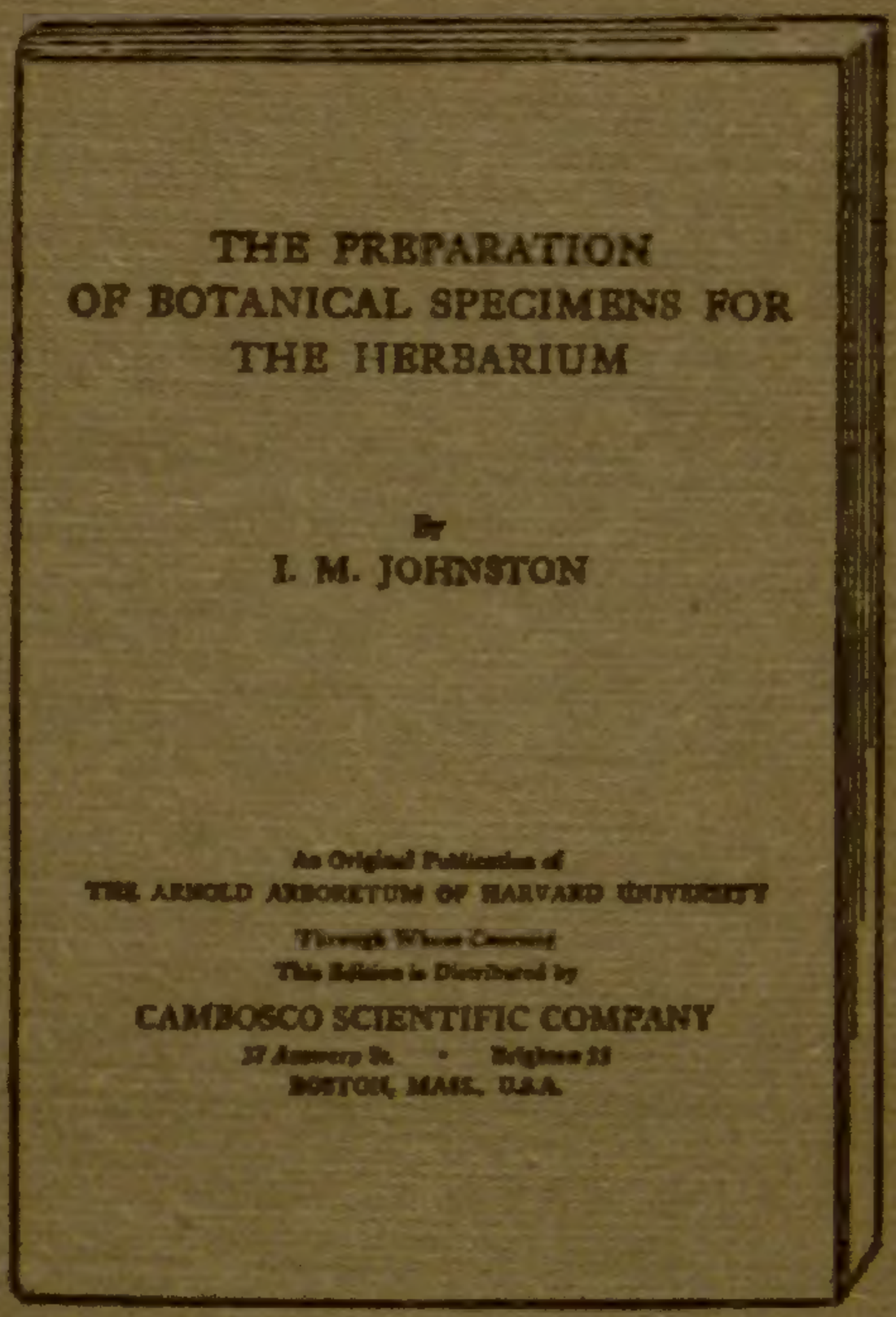

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